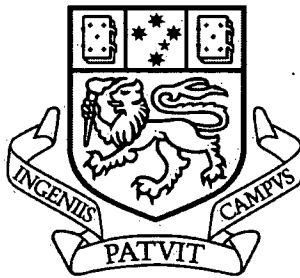


**Investigation into the Relationship
Between Computer Self-efficacy, Anxiety, Experience,
Support and Usage**

By
Janporn Boonyong

Completed in partial requirement of the degree of
Master of Information Systems



A dissertation submitted to the
School of Information Systems
University of Tasmania

November 2004

Statement of Authenticity

This thesis contains no material which has been accepted for a degree or diploma by the university or any other institution, except by way of background information and duly acknowledged in the thesis, and to the best of the candidate's knowledge and belief no material previously published or written by another person except where due acknowledgment is made in the text of the thesis.

This thesis may be made available for loan and limited copying in accordance with the *Copyright Act 1968*.

Janporn Boonyong

November 2004

Abstract

Understanding an individual's use of information technology has become an important determinant of successful usage and implementation of technology. In order to help understand and improve the successful use of information technology this research aim to investigate some key factors that influence an individual's use of information technology and the relationship between those factors. This research examines the relationship between computer self-efficacy, computer anxiety, computer experience, organisational/Faculty support, and computer usage. A conceptual model posits that computer usage is influenced by several factors such as computer self-efficacy, computer anxiety, computer experience and organisational/Faculty support. Based on the responses of 137 Commerce students at University of Tasmania, we found that computer experience and Faculty support had a positive relationship with computer self-efficacy. While computer self-efficacy, computer experience and Faculty support had negative relationship with computer anxiety. However, Faculty support and computer experience were found to have no significant relationship with computer usage. The findings are important as they provide information on how faculties might consider assisting students in their utilising technology.

Acknowledgements

I am sincerely grateful to Mr. Paul Campton, my supervisor, for your guidance and encouragement in this research. Thank you for your patience throughout the whole process of completing this Thesis. Paul's supervision was invaluable and his critique motivational.

I express my love to my parents, Mr. Saknga Boonyong and Ms. Wanpen Boonyong, they are a great support and inspiration me. Also thanks to Mr. Vanidol Lulitanod, who always has supported and encouraged me.

I also thank my friends and colleges. Thank you for your company and advice. Their friendship had made my life in Hobart enjoyable and fulfilling. It was an honour and a pleasure knowing and being your friends.

To the participants and everyone who assisted in this research — without you I would not have finished this study.

Thank you everyone, for great experience.

Janpornb Boonyong (Aui)

Table of Content

Chapter 1: Introduction	1
1.1 Introduction.....	1
1.2 Background	1
1.3 Definition of Terms.....	3
1.4 Research Objectives.....	3
1.5 Research Question and Hypotheses	4
1. 6 Scope of Study	5
1.7 Research Contributions.....	5
1.7.1 Contribution to Researchers.....	5
1.7.2 Contribution to Practitioners.....	5
1.8 Chapter Outline.....	6
1.9 Chapter Summary	7
 Chapter 2: Literature Review	 8
2.1 Introduction.....	8
2.2 Individual's use of Information Technology	8
2.3 Computer Self-efficacy	9
2.2.1 Computer Self-efficacy and Computer Usage	11
2.3.1 Computer Self-efficacy and Computer Anxiety	12
2.4 Computer Anxiety.....	12
2.4.1 Computer Anxiety and Computer Usage.....	14
2.5 Computer Experience.....	15
2.5.1 Computer Experience and Computer Self-efficacy	17
2.5.2 Computer Experience and Computer Anxiety	17
2.5.3 Computer Experience and Computer Usage.....	18
2.6 Faculty Support.....	18
2.6.1 Faculty Support and Computer Self-efficacy	19
2.6.2 Faculty Support and Computer Anxiety	20
2.6.3 Faculty Support and Computer Usage	20

2.7 Conceptual Model	20
2.8 Chapter Summary	22
Chapter 3: Methodology.....	23
3.1 Introduction.....	23
3.2 Research Aims	23
3.3 Philosophical Base	24
3.3.1 Ontology	24
3.3.2 Epistemological.....	25
3.4 Human Ethics.....	26
3.5 Research Method	27
3.5.1 Methodology	27
3.5.2 Survey Scope	28
3.5.3 Survey Instrument.....	29
3.5.4 Questionnaire Design.....	29
3.5.5 Pilot Testing	33
3.5.6 Questionnaire Distribution.....	34
3.5.7 Follow-up.....	34
3.6 Reliability and Validity.....	35
3.6.1 Reliability.....	35
3.6.2 Validity	36
3.7 Analysis of Data.....	37
3.7.1 Data Cleaning.....	37
3.7.2 Data Coding	37
3.7.3 Non-Response Rate Bias.....	38
3.7.4 Data Analysis	39
3.8 Chapter Summary	40
Chapter 4: Analysis of Results	41
4.1 Introduction.....	41
4.2 Data Cleaning.....	41
4.3 Response rate	41
4.4 Test of Non – Response Bias	42
4.5 Descriptive Analysis	44

4.5.1 Demographic Results	44
4.5.2 Descriptive Analysis of Variables Affecting the student's use of computer technology	48
4.6 Inferential Statistics	58
4.6.1 Factor Analysis Test	58
4.6.2 Reliability Tests	61
4.6.3 Normality Tests.....	62
4.6.4 Hypotheses testing	63
4.7 Chapter Summary	74
Chapter 5: Discussion and Conclusion	75
5.1 Introduction.....	75
5.2 Response and Reliability.....	75
5.3 Discussion of Finding	76
5.3.1 General finding	76
5.3.2 Analysis of Variables and Use of Information Technology	78
5.4 The summary of Comparison between the Previous Research and the current research.	84
5.5 Conclusions.....	86
5.6 Limitations	86
5.7 Future research.....	87
References:.....	88
Appendix A:	103
Appendix B:	108
Appendix C:	120
Appendix D:	122

List of Tables

Table 2.1: Business Use of Selected Technologies (From ABS)	9
Table 3.1: Interpretations for values of r	40
Table 4.1: Overall Response Rate.....	42
Table 4.2: Mann-Whitney test for Non-Response Bias (a).....	43
Table 4.3: Kolmogorov-Smirnov Z test for Distribution.....	43
Table 4.4: Levels of Computer Self-efficacy of Commerce student at university of Tasmania	52
Table 4.5: Levels of Computer Anxiety of Commerce student at university of Tasmania	53
Table 4.6: Levels of Faculty support of Commerce student at the University of Tasmania	57
Table 4.7: Factor Analysis – 36 Item Instrument.....	60
Table 4.8: Summary of The 25-items Instrument	61
Table 4.9: Cronbach's alpha reliability coefficients	62
Table 4.10: Test of Normality.....	63
Table 4.11: Spearman Rho's Correlation between Computer Self-efficacy and Computer Usage.....	64
Table 4.12: Spearman Rho's Correlation between Computer Self-efficacy and Computer Anxiety.....	64
Table 4.13: Spearman Rho's Correlation between Computer Anxiety and Computer Usage.....	65
Table 4.14: Spearman Rho's Correlation between Computer Experience and Computer self-efficacy.....	66
Table 4.15: Spearman Rho's Correlation between Computer Experience and Computer Anxiety.....	66
Table 4.16: Spearman Rho's Correlation between Computer Experience and Computer Usage.....	67
Table 4.17: Spearman Rho's Correlation between Assistance Support and Computer self-efficacy.....	68

Table 4.18: Spearman Rho’s Correlation between Access and Hours of Operation Support and Computer self-efficacy	68
Table 4.19: Spearman Rho’s Correlation between Reliability Support and Computer self-efficacy.....	69
Table 4.20: Spearman Rho’s Correlation between Assistance Support and Computer Anxiety.....	69
Table 4.21: Spearman Rho’s Correlation between Access and Hours of Operation Support and Computer Anxiety	70
Table 4.22: Spearman Rho’s Correlation between Reliability Support and Computer Anxiety.....	70
Table 4.23: Spearman Rho’s Correlation between Assistance Support and Computer Usage.....	71
Table 4.24: Spearman Rho’s Correlation between Access and Hours of Operation Support and Computer Usage	71
Table 4.25: Spearman Rho’s Correlation between Reliability Support and Computer Anxiety.....	72
Table 4.26: Summary of Spearman’s Rho Correlation test for relationship of variables	73
Table 5.1: The summary hypotheses comparison of current research and Fagan et al’s research	85

List of Figures

Figure 2.1: Self-Efficacy Model (From Fagan, <i>et al.</i> , 2003/2004:96).....	10
Figure 2.2: Factors Influencing Behaviour (Adapted from Triandis, 1980).....	16
Figure 2.3: Proposed Conceptual Model (From Fagan, <i>et al.</i> , 2003/2004)	21
Figure 4.1: Age Range of Respondents	44
Figure 4.2: Major of Respondents	45
Figure 4.3: Respondents Length of Study in the University.....	46
Figure 4.4: Respondents Education Background.....	46
Figure 4.5: Ownership of Computer	47
Figure 4.6: Respondents using own computer.....	48
Figure 4.7: Respondent's use of the computer laboratory at university	49
Figure 4.8: Respondents' average hours using the computer laboratory per week	50
Figure 4.9: Respondents' percentage of class assignments is done in computer laboratory	50
Figure 4.10: Respondents' overall computer literacy.....	54
Figure 4.11: Respondents' begin using computers.....	55
Figure 4.12: Respondents' knowledge about computer and software	55
Figure 5.1: Results of Hypotheses Test	84

Chapter 1: Introduction

1.1 Introduction

This chapter gives an overview of the research into the relationship between computer self-efficacy, anxiety, experience, support and usage for first year Commerce Students at the University of Tasmania. The background of this research, research scope, objective, research questions and hypotheses of this research also will be addressed. A definition of terms used throughout this thesis will be given. The contribution of this research and the outline of structure of this research will also be given.

1.2 Background

Organizations and businesses are increasingly trying to achieve competitive advantage by supporting their business goals with Information Technology (IT). IT supports their processes, improves business performance and increases capabilities. IT has become an essential component of businesses and organizations (Ward & Griffiths, 1996). Organizations spend large amounts of capital and human resources on IT as it plays a central role in their strategy formulation (Thong & Yap, 1995). However, if individuals use information systems inefficiently then successful utilisation can be hard to achieve. Thus, technology usage and acceptance is an area that organizations need to address. When studying the use and adoption of computer technology, several cognitive theories have been employed in an attempt to better explain how an individual's own psychological makeup can be tied to understanding how they might use IT (Triandis, 1980; Bandura, 1986; Davis, 1989; Ajzen, 1991). Factors that influence individual's use of IT is also an important area of research. The information systems literature has found computer self-efficacy represents an important individual trait.

Compeau and Higgins, (1995) stated, computer self-efficacy represents an important individual trait, which moderates organizational influences on an individual's decision to use computers. Therefore understanding computer self-efficacy is important in the successful use of IT within organizations. In addition, previous research (Compeau & Higgins, 1999; Gist & Mitchell, 1992; Gist, *et al.*, 1988) found that computer self-efficacy is one of the most important determinants of technology usage.

In recent years, the information systems literature has focused attention on the effects of computer self-efficacy and explored the determinants of computer self-efficacy and the relationship between general and specific computer self-efficacy (Agarwall, *et al.*, 2000, Gardner & Rozell, 2000). However, theoretical and empirical literature in the information systems field continues to investigate the factors that influence the adoption and use of IT.

Current interest is on computer self-efficacy and the related factors involved in an individual's use of information technology. Fagan *et al.* (2003/2004) conducted research in the United States of America, that considered computer self-efficacy and the factors related to the use of IT. They combined key constructs from Social Cognitive Theory (SCT), Theory of Interpersonal Behaviour (TIB) and the computer anxiety literature. Fagan *et al.*'s (2003/2004) research suggested that organizations and educators focus their efforts on building computer self-efficacy and on modifying the determinants of computer self-efficacy in order to achieve higher levels of user acceptance of computer technology.

Therefore, this study will particularly look at the impact of computer self-efficacy and the key factors from SCT, TIB and the computer anxiety literature on an individual's use of IT within the Commerce Faculty at the University of Tasmania. Moreover, this study will aim to confirm the findings of contemporary research and to contribute further knowledge. It will employ the instrument used by Fagan *et al.* (2003/2004).

1.3 Definition of Terms

Within this context of study, the terms and definition used were follows:

- **Computer Self-efficacy** - an individual's judgement of their capability to use a computer to accomplish a task (Compeau & Higgins, 1995).
- **Computer Anxiety** - an affective response of apprehensive or fear of computer technology accompanied by feelings of nervousness, intimidation, and hostility (McInerney et al., 1994).
- **Computer Experience** – experience in using computer and related equipment.
- **Faculty Support** – the level of computer related support given by the Faculty to facilitate the completion of tasks by users.

1.4 Research Objectives

The principal objective of this study is to provide insights into the key variables and their relationships, and add to the understanding of the role they play in the adoption and use of information technology. In addition to the principal objective, there are a number of secondary objectives that are being considered in this research area. These are:

- Examine the current level of computer self-efficacy, anxiety, experience, support and usage with Commerce students at the University of Tasmania.
- Explore the role of computer self-efficacy, anxiety, experience, support and use of information technology.
- Extend the knowledge in area of the variables that influence the use of information technology.
- To confirm prior research in the area of computer self-efficacy that asserts it as playing a key role in user acceptance of technology.

1.5 Research Question and Hypotheses

Within the objective of this research, the research questions are:

- What are the current levels of computer self-efficacy anxiety, experience, support and usage of information technology by first year Commerce students at the University of Tasmania?
- What is the relationship between key variables that influence an individual's use of IT?
- What is the impact of computer self-efficacy, anxiety, experience and support on the use of IT?

Based on the existing research undertaken by Fagan, *et al.* (2003/2004), five variables have been reported to have an impact on an individual's use of information technology. Therefore, these variables were examined in this research to find whether the relationships exist. Thus, nine preliminary hypotheses are proposed:

H₀1: Computer Self-Efficacy is not related to Computer Usage

H_a1: Computer Self-Efficacy is related to Computer Usage

H₀2: Computer Self-Efficacy is not related to Computer Anxiety

H_a2: Computer Self-Efficacy is related to Computer Anxiety

H₀3: Computer Anxiety is not related to Computer Usage

H_a3: Computer Anxiety is related to Computer Usage

H₀4: Computer Experience is not related to Computer Self-Efficacy

H_a4: Computer Experience is related to Computer Self-Efficacy

H₀5: Computer Experience is not related to Computer Anxiety

H_a5: Computer Experience is related to Computer Anxiety

H₀6: Computer Experience is not related to Computer Usage

H_a6: Computer Experience is related to Computer Usage

H₀7: Faculty Support is not related to Computer Self-Efficacy

H_a7: Faculty Support is related to Computer Self-Efficacy

H₀8: Faculty Support is not related to Computer Anxiety

H_a8: Faculty Support is related to Computer Anxiety

H₀9: Faculty Support is related to Computer Usage

H_a9: Faculty Support is related to Computer Usage

1. 6 Scope of Study

This research is partially drawn from the work of Fagan, *et al.* (2003/2004). It is proposed to investigate some key variables thought to affect an individual's use of information technology. This research will be undertaken on Commerce students who are currently enrolled in one of four Commerce units: Business Information Systems (BSA101), Introduction to Management (BMA101), Commercial Transactions (BFA141) and Quantitative Methods (BEA140) at University of Tasmania. These are compulsory units within the Commerce Faculty.

1.7 Research Contributions

This research will seek to make a contribution to both researchers and practitioners.

1.7.1 Contribution to Researchers

This study will provide significant information about the relationship of important variables pertaining to an individual's use of IT that relate to acceptance and use of IT from an Australia perspective. This research will provide a better understanding of the relationship of key variables and will contribute to future studies in this area.

1.7.2 Contribution to Practitioners

The finding of this study will provide guiding principle for organizations to understand the variables that influence an individual's use and acceptant of IT and acceptance, which will be able to improve productivity and the prospects for successful implementation of information technology.

1.8 Chapter Outline

There are five chapters in this thesis.

Chapter 1 – Introduction

This chapter presented the perceived research background, research objectives and research questions. The research contributions have been acknowledged. The outline of this thesis will be presented.

Chapter 2 – Literature Review

This chapter will provide a review of the current literature with regard to computer self-efficacy, computer anxiety, computer experience, Faculty support and usage. The following issues will be discussed:

- Individual's use of Information Technology;
- Computer Self-efficacy;
- Computer Anxiety;
- Computer Experience;
- Faculty Support;
- Conceptual Model;
- Chapter summary.

Chapter 3 – Methodology

This chapter will present the research design and research methods that were used in this study. The following topics will be covered:

- Research aims
- Philosophical base of research
- Human Ethics
- Research method
- Reliability and validity
- Analysis of data
- Chapter summary

Chapter 4 – Result and Data analysis

This chapter reports the results obtained from the web-based survey.

The following main areas were presented:

- Response rate;
- Test of non-response bias;
- Demographic results;
- Inferential Statistics;
- Chapter summary.

Chapter 5 – Discussion and conclusion

This chapter will discuss the results outlined in Chapter Four in relation to the research objective.

The following areas will be presented:

- Response and reliability;
- Discussion of finding;
- Conclusion;
- Limitation;
- Further research.

1.9 Chapter Summary

In this chapter the research background, research objectives and research questions were presented. The research contributions to both researcher and practitioner have been acknowledged. Finally, the research outline was addressed.

Chapter 2: Literature Review

2.1 Introduction

This chapter looks at the literature in the area of computer self-efficacy, anxiety, experience, support and usage. It reviews the research in this area and also considers the relationship between these factors. The purpose of this is to consider the main concepts relevant to the research questions, as well as the relevant literature and associated theories. Finally, a model for understanding the relationship between these concepts will be considered. For the ease of reading, the review of literature in this chapter is presented as following: Individual's use of Information Technology, Computer self-efficacy, Computer anxiety, Computer experience, Faculty Support, and the conceptual model for their relationship. As computer use is considered in relation to the other concepts then it will be included in the relevant subsection and hence not have a separate section.

2.2 Individual's use of Information Technology

According to the Australian Bureau of Statistics (ABS), it has shown that there is an increase in business use of computer, the Internet or web presence (See Table 2.1). While there is a greater use of computer technology, Legris, *et al.* (2003) found that IT implementation is costly and has a relatively small level of success. Moreover, Shaw, *et al.* (2002) indicated that the benefit from investing in IT depends on supporting effective use of IT and satisfying IT users. Information systems literature on factors that influence user adoption and use of IT has received increased attention over the past two decades. Several cognitive theories have been developed to explain and help understand the factors that influence an individual's use of IT (Compeau & Higgins, 1995; Gist & Mitchell, 1992; Davis, 1989). An analysis of prior research suggests that computer self-efficacy, computer anxiety, computer experience and Faculty support are important influences of an individual's use of computer technology. The following literature will consider these variables.

Table 2.1: Business Use of Selected Technologies (From ABS)

	1998	2000	2001	2002	2003
Businesses using a computer	63%	76%	84%	84%	83%
Businesses using the Internet	29%	56%	69%	72%	71%
Businesses with a web presence	6%	16%	22%	24%	23%

2.3 Computer Self-efficacy

Computer self-efficacy was introduced to the Information Systems (IS) literature by Compeau and Higgins (1995). They defined computer self-efficacy as an individual's judgment of their capability to use a computer in the accomplishment of a task. Computer Self-efficacy is a concept that has been recently proposed and examined as an additional explanatory variable of an individual's use of information systems/information technology (Compeau & Higgins, 1995; Igbaria & Iivari, 1995; Yi & Venkatesh, 1996). Computer Self-efficacy is an extension of "self-efficacy" to particular domains, including the use of computers. Self-efficacy, as conceptualised in Social Cognitive Theory (SCT) developed by Bandura (1986), is "a person's judgement of his or her capability to organize and execute a course of action required to attain a designated type of performance" (Bandura 1977,1986).

Bandura (1981,1996) indicated SCT as most the accepted empirical theory of individual behaviour (Igbaria & Iivari, 1995). SCT provided a detailed framework for understanding human behaviour, social interaction and psychological well-being (Bandura, 1981, 1997). The theory is centred on the relationship between the person, their environment and their behaviour. SCT suggested there are two major forces that determine behaviour for an individual: efficacy expectations and outcome expectations. Outcome expectation is a person's beliefs regarding the value of the outcome of his/her behaviour, and an efficacy expectation is a person's belief about their ability to perform successfully. Self-efficacy judgments also decide how much effort people will spend on a task and how long they will persist with it (Wood & Bandura, 1989). People with strong self-efficacy beliefs will provide greater efforts to master a challenge while those with weak self-efficacy beliefs are likely to reduce their efforts or even quit (Bandura &

Schunk, 1981; Brown & Inouyne, 1978; Schunk, 1981; Weinberg, Gould & Jackson, 1979).

Bandura (1986, 1997) identified four major sources of information used by individuals when forming self-efficacy: enactive mastery, vicarious experience, verbal persuasion and physiological arousal. Enactive mastery is related to the individual's past experience with the task. Repeated success with a given task will lead to higher levels of self-efficacy. Bandura (1986) stressed that one's mastery experiences are the most influential source of self-efficacy information and provide the most authentic evidence of whether one will be successful. The next source of efficacy information is the vicarious experience concerned with the individual's observations about the success or failure of peers in a given task. Successful task performance by peers of others that one judges to be similar to one's self causes increase in self-efficacy. Individuals also create and develop self-efficacy beliefs as a result of the verbal persuasions they receive from others. Verbal persuasion is concerned with the efforts of others to convince the individual of their ability to complete the task. Physiological arousal is concerned with the individual's feelings, positive or negative, about the task and completion. However, in order to investigate computer self-efficacy Fagan *et al.* (2003/2004) developed a model of a subset of the variable related to computer self-efficacy (See Figure 2.1).

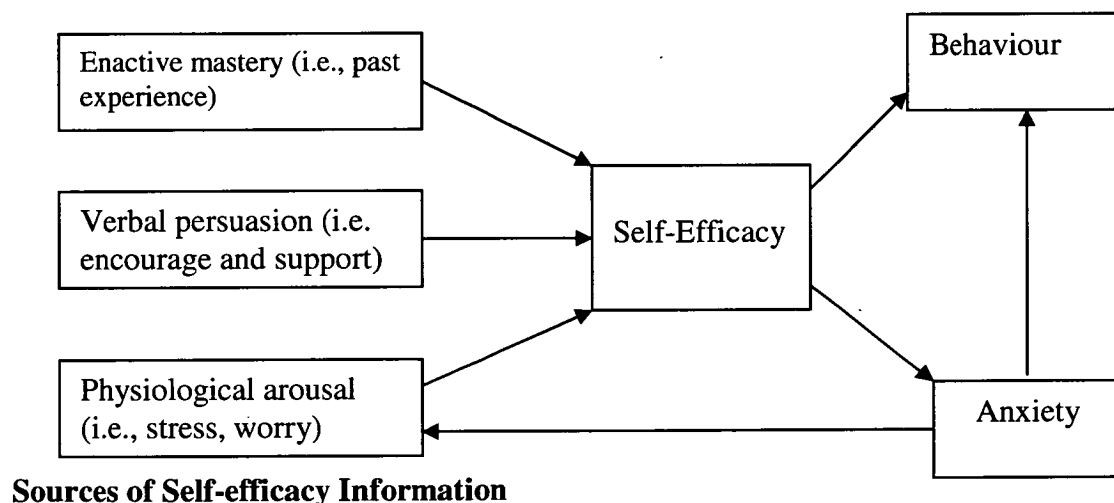


Figure 2.1: Self-Efficacy Model (From Fagan, *et al.*, 2003/2004:96)

2.2.1 Computer Self-efficacy and Computer Usage

Even though SCT is rich and complex and the term self-efficacy is used in relation to any human action, particular aspects of it have been utilized to inform Information System (IS) research, specifically the attempt to explain the use of computers by individuals (Hinnant & Welch 2003). In the late 1980s a number of IS researchers (Burkhardt and Brass, 1990, Gist, *et al.*1989, Hill, *et al.*, 1987, Martocchio and Webster, 1992) started to investigate the relationships between self-efficacy with respect to using computers and a variety of computer behaviours and attitudes. These studies lead to evidence about the relationship between self-efficacy and registration in computer course at universities (Hill, *et. al.*, 1987), performance in software training (Martocchio & Webster, 1993), and innovations (Burhardt & Brass, 1990). These studies suggested that there is still the need for further research to completely explore the role of self-efficacy in computer behaviour.

Compeau and Higgins (1995, 1999) confirmed that an individual's reaction to information technology would be affected by that individual's self-efficacy or confidence that they had with the technology. SCT was used explicitly as the foundation for a research model that tested the relationship of computer self-efficacy and seven other variables including support, anxiety, and usage. The experiential evidence from these studies suggested that high computer self-efficacy is related to a more successful implementation of computer technology and sustained usage.

In a SCT context, individuals with high self-efficacy beliefs are more likely to try to achieve the desired outcome. Gist *et al.* (1989) found that computer self-efficacy should be positively related to the expectation of outcomes for computer use. Past empirical studies on computer self-efficacy indicated a significant positive effect on computer technology use (Belcher & Watson, 1993, Elam & Leidner, 1993; Oliver & Shapiro, 1993; Elam & Leidner, 1995). Compeau and Higgins (1995), for example, indicated that computer self-efficacy influenced expectations about the future outcomes of computer use such as job performance and personal accomplishment. Computer self-efficacy perceptions are also predicted to be a significant precursor to the use of a variety of other technology (Barki & Huff, 1990; Burkhardt & Brass, 1990; Eastin & LaRose, 2000).

Computer self-efficacy has also been studied as an antecedent of perceived ease of use (PEOU), where computer self-efficacy is a determinant of PEOU in the Technology Acceptance Model (TAM) (Venkatesh & Davis, 1996). The key to such TAM theories, is how individual users perceive the characteristics of the technology, as well as the potential benefits associated with its use which is similar to Bandura's definition of self-efficacy (Davis, 1989). TAM explicitly incorporated computer self-efficacy as an external factor affecting perceived ease of use, perceived usefulness and IT usage. A relationship was found between computer self-efficacy and PEOU but none was found between PU and its usage (Igbaria & Iivari, 1995). Lopez and Manson (1997) extended the study between computer self-efficacy and perceived usefulness as used in the TAM. They found that computer self-efficacy was a significant but less substantive influence on usage, directly and indirectly through PU. Chau (2001) studied information technology usage behaviour by combining computer attitude, computer self-efficacy and the TAM model together. This research found that computer self-efficacy has negative effect on PU and no effect on PEOU.

2.3.1 Computer Self-efficacy and Computer Anxiety

Bandura (1986) suggested that self-efficacy acts as a mechanism underlying physiological arousal, and that anxiety occurs because people believe that they are unable to cope with potentially threatening events. Increasing anxiety will lead to subsequent increases in physiological arousal then a potentially debilitating cycle of anxiety can affect their ability to perform, resulting in low self-efficacy. Schwarzer (1996) found that worry was negatively correlated with perceived self-efficacy. Therefore, a negative effect on self-efficacy will result in increased levels of anxiety. In IS literature, the level of computer self-efficacy has been investigated in relation to computer anxiety (Harrison & Rainer, 1992; Havelka, 2003; Thatcher & Perrewé, 2002). Wallace (1999) reported that computing students expressed low levels of computer anxiety and higher levels of computer self-efficacy.

2.4 Computer Anxiety

The construct of anxiety is an important concept in social psychology. However, it is necessary to examine it in relation to the broader context of anxiety in general, in order to understand construct of computer anxiety. Anxiety is a state of feeling

nervous or worried that something bad is going to happen (Oxford, 2000). General emotions associated with anxiety are irritation, frustration, confusion, recognition of failure to understand, and aggression (Glass & Knight, 1988). There are two dimensions to anxiety theory, state anxiety and trait anxiety. State anxiety is a transitory emotional response involving unpleasant feelings of tension and apprehensive thoughts (Spielberger, 1972). This kind of anxiety is temporary when the situation changes, the anxiety will change (Roger, 1984). Trait anxiety relates to the individual differences and the likelihood that a person would experience anxiety in a stressful situation (Spielberger, 1972). However, computer anxiety is close to state anxiety and it can be potentially changed with appropriate involvements such as training or experience. However, trait anxiety is relatively stable and a permanent personality characteristic (Leso, 1992; Igbaria & Iivari, 1995; Woszczynski, *et al.*, 2004).

Computer anxiety has been considered in IS/IT literature during the past two decades and many definitions of computer anxiety have been formulated. Computer anxiety defined by Raub (Cited in Choi *et al.*, 2002:9) is “the complex emotional reactions that are evoked in individuals who interpret computers as threatening”. Igbaria & Iivari (1989: 375) made a major contribution to psychologically-based literature, they defined computer anxiety as the “tendency of an individual to be uneasy, apprehensive, or phobia towards current or future use of computer in general”. Computer anxiety has received considerable attention in the psychologically-based literature, McInerney *et al.* (1994:28) stated that computer anxiety is “an affective response of apprehensive or fear of computer technology accompanied by feelings of nervousness, intimidation, and hostility”. They also suggested that computer anxiety might include worries about looking foolish, embarrassed or even damaging the computer.

Chua and Chen (Cited in Hong & Koh, 2002) classified most past definitions of computer anxiety into two main categories conceptual definitions or operational definitions. Conceptual definitions redefined anxiety simply as an emotional fear, apprehension and phobia toward computers and computer use. On the other hand, operational definitions are used to measure the extent of computer anxiety. Computer anxiety is still an important psychological construct that has been explored within

IS/IT theoretical and empirical literature (Marakas, *et al.*, 1998; Venkatesh, 2000; Agarwal, 2000; Becker & Schmidt, 2001). Subsequent sections will detail the existing literature regarding computer anxiety in order to gain more comprehensive understanding about computer anxiety.

2.4.1 Computer Anxiety and Computer Usage

There is evidence to indicate that computer use by people appears to be limited due to the prevalence of computer anxiety or fear of computers, negative attitudes towards computers in general (Anderson, 1983, Howard and Smith, 1986, Igbaria, 1989; Bozionelos, 1996,). Moreover, Schlenker & Leary (Cited in Woszczynski, *et al.*, 2004) believed that the relationship between anxiety and behaviours is often started by beliefs, therefore, IT/IS research has been studied with this view and incorporated anxiety as a determinant to the beliefs of usefulness and ease of use in Technology Acceptance Model (Igbaria, 1993; Venkatesh, 2000). Computer anxiety has been associated with decreased use and even avoidance, of computer technology (Igbaria, *et al.*, 1994; Weil, *et al.*, 1990; Compeau & Higgins, 1995; Johnson & Marakas, 2000). Bronson (1998) found that computer anxiety discouraged computer use which resulted in poor performance. A number of studies also have provided evidence supporting a direct relationship between computer anxiety and computer use (Brosnan, 1999; Howard & Mendlow, 1991, Igbaria *et al.*, 1996; Scott and Rockwell, 1997; Chua *et al.*, 1999).

The latest study by Brown *et al.* (2004) integrated the literature on computer anxiety and communication apprehension in order to study an individual's attitude toward the use of computer mediated communication (CMC). This research introduced CMC anxiety as an individual's level of fear or apprehension associated with actual or anticipated use of information technology to communicate with others (Brown, *et al.*, 2004). However, there are many aspects when considering the relationship between computer anxiety and usage intention (Elasmar & Carter, 1996), performance (Anderson, 1996), attitudes toward computer (Igbaria & Chakrabari, 1990), learning (Martocchio, 1994), and user's general perceptions about computer use (Venkatesh, 2000). In addition, computer anxiety is frequently studied in relation to age, gender

and prior computer experience (Maurer, 1994; Igbaria & Parasuraman, 1989; Rosen & Maguire, 1990; Todman & Monaghan, 1994).

2.5 Computer Experience

The literature related to computer experience, reveals that several cognitive theories have been employed, these include Theory of Interpersonal Behaviour (TIB), SCT, TAM (Compeau & Higgins, 1995; Taylor & Todd, 1995; Harrison & Rainer, 1992). It has been shown that prior experience is an important determinant of behaviour (Triandis, 1980; Ajzen 1980; Bagozzi, 1981; Davis, 1989; Taylor & Todd, 1995). Triandis (1980) proposed TIB, and noted that behaviour is established by three dimensions: intention, facilitating conditions and habit (see Figure 2.2). Intention is an individual's motivation regarding the performance of a given behaviour. Facilitating conditions characterize objective factors that can make the realisation of a given behaviour easy to achieve. On the other hand, barriers consist of factors that can obstruct or restrain the realisation of the behaviour. Habit represents the level of regular behaviour. Therefore, behaviour is usually influenced by habits, by their behavioural intentions, and by facilitating conditions.

Triandis (1980) suggested that facilitating conditions work with intentions and prior experience to facilitate the likelihood of particular behaviours by providing opportunity and cues that contribute to an individual's expectations. He also stated that intentions and prior experiences are the dominant influences on behaviour, with facilitating conditions acting as mediators that facilitate or impede behaviours. Many researchers (Triandis, 1980; Fishbein & Ajzen, 1980) have suggested that knowledge gained from past behaviour would help to form intention because in part experience makes knowledge more accessible in memory and make low probability events more relevant as they are accounted for in the formation of intentions.

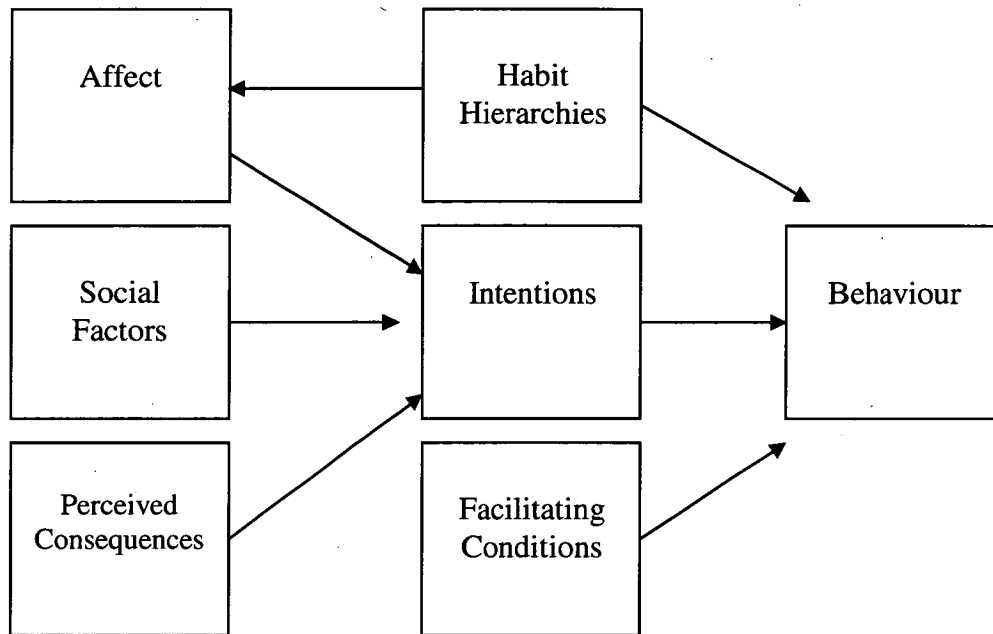


Figure 2.2: Factors Influencing Behaviour (Adapted from Triandis, 1980)

As mentioned before ‘habit’ has been used to determine prior computer experience for studying individual IT usage, acceptance and behaviours in IS/IT literature. This is due to habit representing the level of regular of behaviour that is measured by the frequency of occurrence of act, and, as a result, the performance of a behaviour is increased, and its effect on later behaviour is also expected to increase. Bergeron, *et al.* (1995), tested the use of executive information systems (EIS). They examined EIS, and noted that experience is equivalent to habits, work group influence is equivalent to social factor, user satisfaction with information, systems access and assistance is equivalent to affect, perceived consequences of EIS use is equivalent to perceived consequences, and EIS sophistication is equivalent to facilitating conditions. Moreover, the IS/IT literature noted that both habit and computer training are important sources of information and experience for changing self-efficacy beliefs (Saks, 1995; Rosen & weil, 1995).

2.5.1 Computer Experience and Computer Self-efficacy

Bandura (1986), indicated that prior experience refers to as enactive mastery, and has been found to have the most influential source of self-efficacy. Therefore, computer related experience would be expected to have a correlation with computer self-efficacy. IS/IT research has been revealed that prior computer experience is a major variable that predicts self-efficacy in using computers and information systems (Hill *et al.*, 1987; Harrison & Rainer, 1992; Henry & Stone, 1994; Karsten & Roth, 1998; Eastin & Larose, 2000; Hinnant & Welch, 2003). These studies found previous computer software experience to be consistently related to task-specific computer self-efficacy (Martocchio & Dulebohn, 1994; Martocchio, 1994; Busch, 1995; Havelka, 2003).

Research has shown that individuals with more computer experience had evidence of higher levels of computer self-efficacy. (Harrison & Rainer, 1992; Compeau & Higgins, 1995; Zhang & Espinoza, 1998; Eastin & LaRose, 2000; Hung & Liang, 2001). Marakas *et al.* (1998) demonstrated that prior experience in completing a specific task increases a person's self-efficacy when comforted with a new but similar task. Marakas *et al.* (1998) found that people enter a training situation had varying degrees of prior experience in the particular activity domain. Staples *et al.* (1998) found that when remote work experience and training increased, their remote work self-efficacy judgments also improve.

2.5.2 Computer Experience and Computer Anxiety

It has been shown that computer anxiety is the most consistent variable reported on in relation to computer experience (Igbaria & Parasuraman, 1989; Chu & Spires, 1991; Igbaria & Chakrabarti, 1990; Todman & Monaghan, 1994). Prior computer experience has also been found to predict computer anxiety and research has found that there is a significant, though weak, negative relationship between computer anxiety and computer experience (Reed & Palumbo, 1988; Liu, *et al.*, 1992; Maurer, 1994; Bohlin & Hunt, 1995). Necessary and Parish (1996) found that increased levels of computer experience and weekly computer usage were both related with reduced levels of computer related anxiety. Ayerman & Reed (1996) also reported that not enough exposure and experience with computers leads to computer anxiety. However,

some studies (Weil et al. cited in Choi et al,2002; King, 1993; Gos, 1996) found positive relationship between computer experience and computer anxiety, which is due to the time they spent working on a computer, as more experience with computers means having spent more time with computers as well.

2.5.3 Computer Experience and Computer Usage

Computer experience has been used for studying individual IT in relation to usage, acceptance and behaviour (Ajzen, 1980; Triandis, 1980; Bergeron & Raymond, 1992; Bergeron, 1996; Muhammad & Olusegun, 1999). Computer experience have been found to be related to computer use where increased computer experience was related to a high level of computer use (Tay & Todd, 1995; Marakas, *et al.*, 1998; Igbaria, *et al.*,1996 Bergeron, *et al.*,1996; Brohman & Parent, 2001; Chang, & Cheung, 2001; Pare & Elam, 1995). Moreover, computer experience has been shown related to computer attitudes (Jay & Willis, 1992; Colley, *et al.*, 1994; Conger, *et al.*, 1995; Bunting, *et al.*, 2001).

2.6 Faculty Support

End-user computing has been subject to several studies over past two decades (Leitheiser & Wetherbe, 1985; Bergeron, *et al.*, 1990). From these studies, the support provided to users has been reported as being an important variable for using computer. Sumner (cited in Harris, 1992) reported the results of a descriptive study conducted in 13 organisations that supported end-user computing activities through an information centre. Rivard and Huff (1988) performed similar studies, in which they found that the support received from the information systems department is the variable most closely related to overall user satisfaction with end-user computing. However, other researchers investigating end-user computing have also studied identification of the major dimensions of support (Leitheiser & Wetherbe, 1985; Rivard & Huff, 1988). Rockart and Flannery (1983) noted four main dimensions of support for users. These were the development of a distributed organisation for support, the provision of a wide spectrum of products, the development of a substantial education program, and the development of effective data migration procedures. Magal, *et al.* (1988) proposed five components for quality support

services; they are as a competent staff, support software packages, end-user training, reliability of applications developed, and training for staff.

From the TIB model, organisational support was an issue for facilitating conditions. Triandis (1980) further acknowledged that even when intentions are high, behaviour may not occur if the “characteristics” of the situation (facilitating conditions) makes the behaviour impossible. Support for the investigation of organisational facilitating conditions can be found in the IS literature (Bergeron *et al.*, 1990; Thompson, *et al.*, 1991; Zinatelli *et al.*, 1997; Fagan, *et al.*, 1003/2004). Tan and Teo (2000) mentioned facilitating conditions as both supporting Internet commerce applications, technology become easily and readily available, and government supports that play an intervention and leadership role in the adoption of Internet banking. Venkatesh *et al.* (2003) defined organisational facilitating conditions as the degree to which an individual believes that an organisational and technical infrastructure exists to support the use of the system, these included management support and training.

2.6.1 Faculty Support and Computer Self-efficacy

Bandura (1986) stated that individuals could create and develop self-efficacy beliefs of the verbal persuasions they receive from others and situational support is suggested as one of variable that is related to self-efficacy. That is, self-efficacy is an important individual trait, which moderates organizational encouragement and support influences on an individual's decision to use computers. Compeau and Higgins (1995) identified encouragement, other people's use, and organizational support as having significant influence on computer self-efficacy. The higher the support for computer users in the organizational/Faculty, the higher the user's computer self-efficacy (Igbaria & Iivari, 1995; Compeau & Higgins, 1995; Gist & Mitchell 1992; Fagan *et al.*, 2003/2004).

2.6.2 Faculty Support and Computer Anxiety

Organisational/Faculty support has been shown to help reduce computer anxiety. Users can familiarise themselves with information systems by having adequate support (Coffin & MacIntyre, 1999; Vician & Brown, 2002/2003) found that teachers who did not have their principal's support for computer usage reported higher levels of anxiety than did those who did have this support. Therefore, the relationships between Organizational/Faculty support and computer anxiety have reported as have a negative relationship (Torkzadeh & Angulo, 1992; Gist & Mitchell, 1992; Rosen & Maguire, 1990)

2.6.3 Faculty Support and Computer Usage

Thompson, *et al.* (1991) recognised the value of user training as a “facilitating condition” for achieving objectives related to information use and implementation. A number of IS/IT researchers found that the role of Organisational/Faculty support was associated with great computer usage (Cheung *et al.*, 2000; Tan & Teo, 2000; Igbaria *et al.*, 1996; Venkatesh *et al.*, 2003). These researchers have confirmed that Organisational/Faculty support was significantly related to computer use. Other studies also indicated that Organizational/Faculty support, which included management support, was positively related to computer use (Igbaria, *et al.*, 1996).

2.7 Conceptual Model

Whilst we have examined the relationship between pairs of variables in order to gain a fundamental understanding of the relationship, there exists a more complex relationship. Fagan *et al.* (2003/2004) presented a model which encapsulated the variables, computer self-efficacy, computer anxiety, computer experience, Organization/Faculty support and computer usage. Figure 2.3 illustrates a model containing the relationship between the variables being investigated in this research.

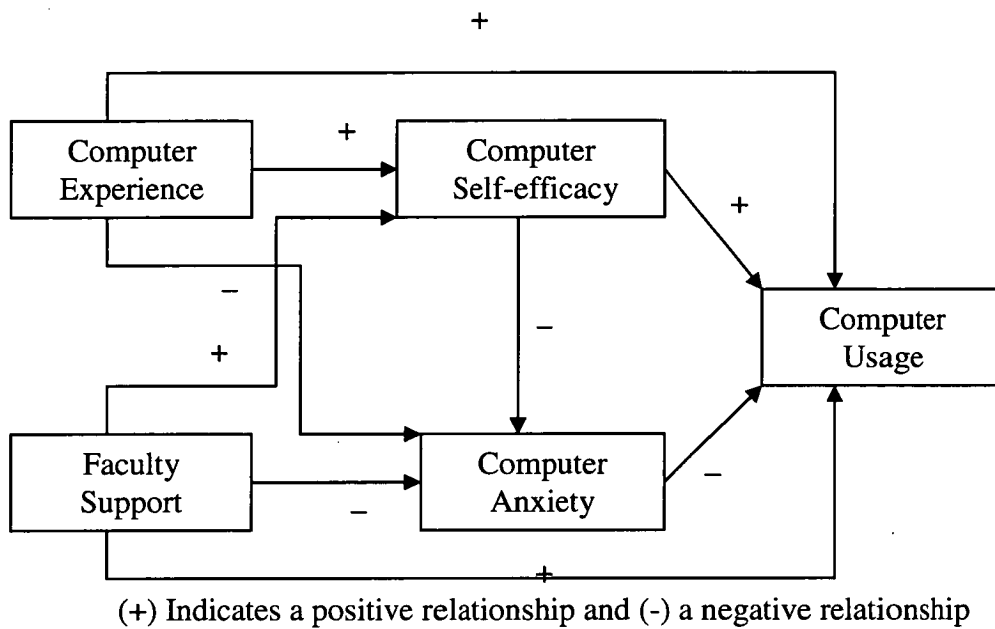


Figure 2.3: Proposed Conceptual Model (From Fagan, *et al.*, 2003/2004)

Since computer self-efficacy is concerned with an individual's judgments regarding the use of IT, there are a wide variety of antecedents and consequences of self-efficacy that need to be considered in the light of the using diverse IS/IT literature and social psychology literature. Fagan *et al.* (2003/2004) model (Figure 2.3), shows that antecedents include social constructs, such as Organizational/Faculty support (Compeau & Higgins, 1995), demographic variables, such as computer experience (Igbaria & Iivari, 1995), beliefs, such as anxiety, outcome expectations (Harrison & Rainer, 1992).

The social psychology literature indicated that experience gained through direct use is one of the most important sources of information about one's self-efficacy. Increased user computer experience has been found to influence user beliefs about IT (Rivard and Huff, 1988) and enhance the user's confidence in user's ability to understand and use of IT (computer self-efficacy) in performing the computer task (Kraemer *et al.*, 1993). Moreover, Venkatesh and Davis (2000) suggested that the user's behavioural intentions formed through initial persuasion and training may change as user's experience increase. Therefore, experience with computers enhanced individual's

computer self-efficacy, which then in turn is related to the use of computer technology.

Some studies have investigated ways of reducing computer anxiety such as providing more experience using computer technology (Maurer, 1994), and computer instruction, support and good working environment (Rosen & Weil, 1995). Gist & Mitchell (1992) suggested that a good physical working environment will positively impact an individual's performance beliefs. Therefore, computer experience will decrease computer anxiety and affect computer usage. Anxiety also has been applied to SCT context, Meece, et al., (1990) investigated this relationship with regard to achievement anxiety and found that people with low self-efficacy were anxious. Therefore, people who have low experience and self-efficacy will have high computer anxiety.

Based on the IS literature, Fagan, *et al.* (2003/2004) conceptual model showed the relationship between the variables to be considered in this research. As described above, Faculty support is positively related to computer self-efficacy, computer self-efficacy is negatively related to computer anxiety and the positively related to computer usage, and computer anxiety is negatively related to computer usage.

2.8 Chapter Summary

In this chapter, the relevant literature was presented in order to have an understanding of the key variables that influence an individual's use of IT. Self-efficacy, which is concerned with an individual's judgments regarding the use of IT, can be linked to other variables associated with an individual's IT usage. The variables that influence an individual's use were discussed in detail. A conceptual model which showed the relationship between those variables was explained.

Chapter 3: Methodology

3.1 Introduction

This chapter we consider the aims and methodology employed to meet the objectives of this research. The content of this chapter will consist of the research aims, the overview of the philosophical basis for the research, the approach, ethics approvals and the hypotheses employed. The data collection method, pilot study will also included followed by the reliability and validity issues, and lastly, discussion on the data analysis method using descriptive and inferential statistics

3.2 Research Aims

From the research background in Chapter 1, it has been established that an individual's use of information technology is a significant research area. The aim of this research was to provided insights into key variables that influence an individual's use of information technology, the relationships of the variables, and also consider the role that those key variables play in the adoption and use of information technology. In addition, to the principal objective, there are a number of secondary objectives that will being considered in this research. The aims of this research are to:

- Examine the current level of computer self-efficacy, anxiety, experience, support and usage of information technology for first year Commerce students at the University of Tasmania;
- Explore the relationship of computer self-efficacy, anxiety, experience, support and usage of information technology;
- Extend the knowledge in area about the variables that influence the use of information technology;
- To confirm prior research in the area of computer self-efficacy and its role in user acceptance of technology.

3.3 Philosophical Base

This research is based on a positivist epistemological approach and an objective ontology. Ontology and epistemology are explained as follows.

3.3.1 Ontology

Ontology is concerned about the way people view the world, whether people believe that the world exists independently of them, or if it only exists within the minds of those people experiencing the world (Laresgoiti *et al.*, 1996; Orlikowski & Baroudi, 1991). Ontology is categorised into two major types, objective and subjective. Objectivism refers to removing feeling relating to the objects being examined, the object being considered to be independent of personal feelings (Ticehurst & Veal, 1999). A researcher who adopts an objective ontological stance considers that they do not influence the research results (Neuman, 2003). Subjectivism is relative in nature. It holds the belief that the world consists of social constructs and that no reality exists outside the perspectives of the participants (Ticehurst & Veal, 1999). The subjective researcher takes into account that their presence, knowledge and values may influence the research results (Neuman, 2000).

This research adopted an objective ontological stance. The aim of this research was to investigate the relationship between computer self-efficacy, anxiety, experience, support and usage from the perspective of first year commerce students enrolled at the University of Tasmania. The data obtained came from a web-based survey questionnaire completed by the commerce students. The sample population was those students who were enrolled in the commerce's major units at University of Tasmania. In addition, the data collection was unobtrusive and believed by the researcher to have no influence on the answers supplied by the respondent and does not contain any of the researcher's perceptions. Therefore, an objective ontological stance was adopted as the most appropriate for this research.

3.3.2 Epistemological

Epistemology is the study of what is required in order to have rational beliefs and knowledge (Cruz, 2000). It refers to the beliefs about knowledge and how we know things (Myers, 1997; Orlikowski & Baroudi, 1991). These beliefs can be broadly classified into three main research paradigms, positivist, interpretivist, and critical research (Neuman, 2003; Cavana *et al.*, 2001). According to Neuman (2003) most ongoing social research is based on the first two, with positivism being the oldest. Newman (2003) stated that each approach is associated with different traditions in social theory and uses diverse research techniques. However, Ridley and Keen (1998) found that positivism formed a majority of the epistemologies in use within Information Systems (IS) research in Australia, followed by a minority of interpretivist and critical epistemologies respectively.

Positivist epistemology is the social scientific approach that closely aligns itself with the approach of natural sciences (Cavana *et al.*, 2001; Neuman, 2003). This positivist research is known by other names in the research field: logical empiricism, the accepted or conventional view, post positivism, naturalism, the covering law model and behaviourism (Neuman, 2003). In order to conduct a positivist research, the research uses deductive reasoning beginning with a theoretical position and moving towards concrete evidence (Cavana *et al.*, 2001). Cavana *et al.*, (2001) also states that the hallmark of good positivist research is replicability, which means that another researcher should be able to conduct the same research with the same method and come up with comparable results. The positivist research use precise, objective measures and is usually associated with quantitative data (Cavana *et al.*, 2001). Neuman (2003) also confirmed this report that quantitative research primarily is based on assumptions from the positivist approach to science and often use experiments surveys and statistics. The research that adopts this stance is expected to add to an existing knowledge and independent of the phenomenon that they are studying, therefore it will not include the researchers' beliefs (Orlikowski & Baroudi, 1991).

Interpretivist is the way to analyse socially significant action throughout the direct detailed observation of people, this research believes that it is more likely that people

experience physical and social reality in different ways (Cavana *et al.*, 2001). The interpretivist researcher emphasises a detailed reading or examination of text, which could refer to a conversation, written words, or pictures, interviews and case studies (Neuman 2003; Cavana *et al.*, 2000).

This research is focused on the key factors that affect an individual's use of information technology. It examined the relationship between factors that affect the use of information technology from the perspective of students in the Faculty of Commerce Faculty at the University of Tasmania. This research employed quantitative statistical methods as it could provide the means to address the specific research question. The positivist research is based on things that can be seen or proved rather than on ideas (Neuman, 2003). This also allows the researcher to identify the descriptive demographic information and to test hypotheses (Sekaran, 2000). Therefore, the researcher found that the positivist epistemology was the most appropriate research method to meet the research aims.

3.4 Human Ethics

Neuman (2000) mentioned that privacy is a major ethical issue in conducting the research. Therefore, prior to commence this research it was necessary to obtain ethical approval from the Southern Tasmania Social Sciences Human Research Ethics Committee, since this research was involving or impacting upon human subjects. This Committee is accountable to the Pro-Vice-Chancellor (Research) of the University of Tasmania, Department of Health & Human Services (under the HREC (Tasmania) Network) and the National Health and Medical Research Council (NHMRC).

In order to gain approval from the Ethics Committee, the researcher completed a Minimal Risk Assessment Form (Social Science Application) with an attached Information Sheet (see Appendix A) and a copy of the web-based questionnaire (see Appendix B). Several issues needed to be considered by the Ethics Committee, these included privacy legislation, potential risks for participants, and confidentiality and anonymity before approval for research was approved. After the Ethics application had been approved (see Appendix C), the researcher employed a web-based survey to collect the data.

3.5 Research Method

This section describes the research approach and hypotheses. The sample population, research instrument and data collection method will also be discussed.

3.5.1 Methodology

According to Cavana *et al.* (2001) research can generally be divided into two major methods, these are quantitative and qualitative. They suggest that qualitative methods reveal people's values and belief, interpretative schemes, and rules of living so that the respondents' reality can be understood. Qualitative method emphasizes conducting detailed examinations of a few cases or subjects that arise in the social practices. This is done to understand how participants explain their own world rather than being concerned primarily with representative samples (Jackson, 1995; Neuman, 2000).

Quantitative methods rely on the ability of the research to measure the phenomena under investigation and the use of statistics to analyse the raw data as well as measure the objective facts (Cavana *et al.*, 2001; Neuman, 2003). In other word, quantitative methods emphasize precisely measured variables and testing hypotheses relies on numerical evidence to draw conclusions (Ticehurst & Veal, 1999; Neuman, 2003).

However, both qualitative and quantitative methods offer a variety of collection techniques. Qualitative methods include interviews, focus groups and observations, while quantitative methods include questionnaires, files and laboratory experiments and use statistics (Cavana *et al.*, 2001; Neuman, 2003).

The aim of this research was to investigate the relationship between keys factors thought to affect an individual's use of information technology. A web-based survey was used to collect data in order to test the hypotheses. Therefore, a quantitative approach was considered the most appropriate method for this research. Moreover, this method can describe both individual variables and the correlation between several variables and deals with a large population, all of which suit the context of this research.

3.5.2 Survey Scope

The main objective of its research is to investigate key variables that affect student's use of information technology in the university. As a previous study was undertaken on business school students attending a major southeastern university in the United States (Fagan *et al.*, 2003/2004), this thesis will identify the sample from students, who study in Faculty of Commerce at the University of Tasmania.

The research mainly focused on Commerce students who enrolled in one of four units; Business Information Systems (BSA101), Introduction to Management (BMA101), Commercial Transactions (BFA141) and Quantitative Methods (BEA140) at the University of Tasmania. These are compulsory units for all Commerce majors. Moreover, the computer usage that is measured in this study is the usage of the university computer laboratories. The Commerce students in those units have to attend and use the University's computers as part of their unit requirements. Therefore, Commerce students in those units are appropriate subjects for this research.

3.5.2.1 Population Size

The previous study by Fagan *et al.* (2003/2004) was based on the population of 978 business students. Information about the number of students in each unit was obtained from the unit co-ordinators for the four units. It was found that the whole population for this the current study was 915 students. A decision was made to include the whole population of 915 students. This survey used a web-based survey, with the URL address being distributed by e-mail or e-notice therefore, a sampling population approach was unnecessary and inappropriate. Within the proposed population, 15.3% (140 students) is from BSA 101, 30.6 % (280 students) is from BFA 141, 16.9% (155 students) is from BMA 101, and 37.2% (340 students) is from BEA 140.

3.5.3 Survey Instrument

This research replicated and adapted the previous research conducted by Fagan *et al.* (2003/2004). The questionnaire instrument used in this research was derived and adapted from the previous research instrument used by Fagan *et al.* (2003/2004). There are significant reasons for using an existing instrument. Firstly, the instrument is applicable to the context of this research, in that it was focused on student's use of information technology in a university environment. Secondly, the existing instrument was derived from other existing instrument that has been proven to have a high level of validity and reliability as it had used in a previous study. Finally, the existing instrument helped save questionnaire development time, this is particularly important given the short time frame available for this research.

However, a minor change was carried out to a phrase that is used in Fagan *et al.* (2003/2004)'s instrument. "Organization Support" was revised to "Faculty Support" to better reflect the local circumstances in this research. The research also adapted the language of some questions to make it clearer, simpler and more appropriate for respondents. Barbara Ross Wooldridge, an author of the previous study, also indicated the scale used in the questionnaire. The researcher tried to maintain the original content.

3.5.4 Questionnaire Design

There are several methods for collecting data such as interview, mail questionnaire and electronic questionnaire (Neuman, 2003). Frazer and Lawley (2000) suggested that the choice of the questionnaire communication method might depend on personal preference, cost, time constraints, potential response rate or many other criteria important to a particular research.

Electronic questionnaires are similar to mail questionnaires as they are easier to administer and respondents can answer at their convenience (Cavana *et al.*, 2001). Web-based surveys have been found to offer many benefits including cost effectiveness (Gunn, 2002), there is minimal cost in conducting a web-based survey when the resources are freely available. The web-based surveys also are faster in delivery and response rate than paper-based survey (Couper, 2000; Gunn, 2002).

Additionally, it is easier to send reminders to participants (Gunn, Kennedy, Kuh & Carini, 2000). Web based-surveys also make it easier to process data, as the researcher can download data to a spreadsheet or SPSS (Gunn, 2002; O'Neill, McClain & Lavoie, Palmius, 2003).

However, the web based-survey have some disadvantages, these include respondents must be computer literate and have access to computers or email (Sekaran, 2000; Cavana *et al.*, 2001). In addition, respondents must also be willing to complete the survey (Cavana *et al.*, 2001). The response rates in web-based survey are rather ambiguous, lack of anonymity may also be an issue with web-based surveys (Couper, Blair, & Triplett, 1999; Klassen & Jacobs, 2001).

However, electronic questionnaire or web-based survey were selected as the appropriate for this research as the four units gave us a large population size. There were a number of budgetary restraint which would have limited a mail-based questionnaire to a sample of 300. Moreover, the targeted respondents for this research were students who use computer laboratories. The reasonable assumption would be that these students would have the knowledge and access to using the Internet facilities at the University to view the web-based survey. These students were informed through their unit co-ordinators for each unit. The unit co-ordinators were contacted and the URL address of the web-based survey emailed to them, and then be forwarded to the student or placed on their E-learning Systems (WebCT), along with the information sheet for this research.

The web-based survey system used was Mod_Survey version 3.0.16 (pre-release) Mod_Survey is a generic program that allows the researcher to easily create questionnaires using a definition language, XML language (Palmius, 2004). The web-based survey is supported through a password protected URL address hosted by the School of Information Systems, University of Tasmania. It was under direct supervision of the researcher to ensure confidentiality and security of data collected.

3.5.4.1 Questionnaire Structure

The layout and presentation of the questionnaire was important since the overall impression given by the questionnaire can be all-important in obtaining a response (Ticehurst & Veal, 1999). Since the research employed a web-based survey, the researcher will have to consider several issues in order to have a professional construction. The researcher has to address the use of white space, ease of navigation, and choice of fonts.

Lengel (2002) has shown that the text on a computer screen is much easier to read when the displayed text is fairly large, displayed in a single column and about five inches wide with plenty of white spaces around the edges. The traditional method of black text on plain white background is found to be the best. Lengel (2002) also recommended that the use of serif fonts, such as Times New Roman to be the best fonts to use (especially on the Internet).

It is also important that the researcher include an introductory page when respondents enter into this secured website. Information regarding the research would be displayed on this page. At the end of the introductory page a hyperlink is inserted with a "Proceed to Questionnaire" button that would allow respondents to then transfer to the actual web-based survey. The researcher had took into consideration greater use of white space, as well as making sure that all information, including the hyperlink fitted into one page without having to scroll down, for the convenience of the respondents. The respondents could submit the completed questionnaire by clicking the "Submit" button.

The questionnaire used in this study was separated into six main sections, numbered alphabetically from Section A to Section F.

Section A was consisted of eight main demographic questions, these are arranged below:

- Six questions were created using the 'choice tag' which allows the respondents to choose an answer by selecting one of the radio buttons,

- Two questions used the 'memo tag' to accompany one of the 'choice tag' question, where the respondents were allowed the option to include additional information about their major in the faculty and their level of education.

Section B and Section E evaluated student's overall response about computer usage and computer experience respectively. Six questions were organised using a 'choice tag' that allows the respondents to choose an answer by selecting one of the radio buttons.

Section C, Section D and Section F evaluated student's overall responses to computer self-efficacy, computer anxiety and Faculty support respectively. All 33 statements used in this questionnaire were divided and arranged using a 'matrix tag' that defined the statements into groups of tables. The statements were rated using a five-point Likert scale, ranging from 'strongly disagree' to 'strongly agree' in Section C and D, and using a ten-point Likert scale, ranging from 'Poor' to Excellent" in Section F

At the end of the web-based survey, respondents were asked to give comments about other factors that they thought may have affected the adoption of information technology. The actual web-based questionnaire is attached at Appendix B.

3.5.4.2 Questionnaire Content

- **Section A – General Information**

This section contained eight questions relating to demographic information upon which analysis would be undertaken. This section aim to gather information about respondents, demographic items included age, gender, respondent's major of study, number years that the respondent has been studied in this university, educational background, number of unit that required using computer laboratories in the semester. Moreover, they were also asked about the use of computer at their home.

The responses from this section were then be analysed using descriptive statistics. The next five sections were aimed to determine the student response about the key variables that influence their use of information technology.

- **Section B – Computer Usage**

This section contained three questions related to the information about usage of computer laboratories.

- **Section C – Computer Self-efficacy**

This section contained five statements related to their use of computers to complete tasks. Statements regarding their confidence in using computer were asked.

- **Section D – Computer Anxiety**

This section contained five statements related to computer anxiety, and their avoidance of using computers.

- **Section E – Computer Experience**

This section contained three questions related to overall computer experience. Statements with regards to overall computer literacy and knowledge were asked.

- **Section F – Faculty Support**

This section contained twenty-three statements related to Faculty support. The respondents were asked to indicate if they believed that the Faculty assisted and supported them in their use of computers to complete their tasks.

3.5.5 Pilot Testing

The pilot test is to check the questionnaire wording, question sequencing, lay out and to analyse procedure (Ticehurst & Veal, 1999). According to Neuman (2003) the pilot test is used to increase reliability of research instrument. A pilot test was conducted on August 16, 2004 within a tutorial session. There were no changes to the actual survey content as a result of the pilot test. The final questionnaire (see Appendix B) was distributed to the target group one week after conducting the pilot test.

Another difficulty faced during the pilot testing was that respondents could not go directly to web-based survey from a word document. When unit co-ordinators send out e-mails or uploaded documents about this survey in WebCT, they sometimes posted the URL address in a word document. The respondents who wanted to

participate with this survey then clicking on the direct URL and the file could not open that page. There were security and access reasons. This problem was out of control of the researcher, however, the researcher decided to inform the unit co-ordinators to advise their students to use copy then paste the URL on to the Internet browser in order to access the web-based survey.

3.5.6 Questionnaire Distribution

The web-based questionnaire was distributed to the students through their respective unit co-ordinators on 23rd of August 2004. Students were contacted through email or WebCT by their unit co-ordinators along with a hyperlink to the introductory page of web-based questionnaire. The URL address was [https://survey.infosys.utas.edu.au/computer use/introduction.htm](https://survey.infosys.utas.edu.au/computer_use/introduction.htm). The students were encouraged by the unit co-ordinators to complete the questionnaire.

Interested respondents were transferred to the introductory page through the hyperlink where they were able to read detailed information regarding the research and the web-based questionnaire. The introductory page invited the respondents to participate in the research and included the contact details of the Chief Investigator and the researcher for further inquiries, estimated time to complete and an assurance of confidentiality for the respondents.

3.5.7 Follow-up

After ten working days, the researchers sent a follow-up of the invitation in order to increase the response rate. A reminder email was developed and distributed to the unit co-ordinators again on September 13, 2004. The email expressed appreciation to those who had already completed the questionnaire and it also encouraged those who had not completed the questionnaire to participate in this research.

3.6 Reliability and Validity

As mentioned earlier, the research survey instrument used was derived and adopted from Fagan *et al.* (2003/2004), this meant the research adopted the same level of reliability and validity of the instrument used in this earlier research. Reliability and validity are core issues in conducting measurement in research (Neuman, 2003). However, it is important that the reliability and validity of this research instrument be tested.

3.6.1 Reliability

As Ticehurst and Veal (1999) stated, reliability is “the extent to which research findings would be the same if the research were to be repeated at a later date, or with a different sample of subjects”. Babbie (1990) explained that reliability means dependability or consistency, it is “a matter of whether a particular technique, applied repeatedly to the same object, would yield the same result each time”. There are three types of reliability, these are stability reliability, representative reliability and equivalence reliability (Cavana *et al.*, 2001; Neuman, 2003). Stability reliability is where the same results can be delivered while using the measure in a different time period. Representative reliability means different groups of people will return the same answer for the same indicator. Equivalence reliability is applied when researchers use multiple indicators or split half instruments and measure the same construct (Neuman, 2003). However, to improve reliability, Neuman (2003) suggested that there are four ways to increase instrument’s reliability. These are, include to clearly conceptualised constructs, to increase the level of measurement, to use multiple indicators of variable and to use a pilot tests.

Therefore, to increase reliability, the following approaches were undertaken in this research. The instrument used in this research was a replication of a previous research conducted by Fagan *et al.* (2003/2004). Moreover, Fagan *et al.* (2003/2004) adapted this instrument from other well-known instruments that have proven their reliability by being tested repeatedly in other research (Cohen & Waugh, 1989; Davis, 1989; Murphy, Coover, and Owen, 1989). The researcher also decided to maintain and follow the existing instrument by using a 10-point Likert scale to preserve reliability,

according to Neuman (2003) indicators at higher or more precise levels of measurement are more likely to be reliable than less precise measures because the latter identify less detailed information. In addition, a pilot test of the questionnaire was carried out and helpful feedback provided was conducted to improve the reliability.

3.6.2 Validity

Validity “suggests truthfulness and refers to the match between a construct, or the way a researcher conceptualizes the idea in a conceptual definition, and a measure” (Neuman, 2003). According to Page and Meyer (2000), an instrument is valid when it provides precisely the same measure every time. There are four types of validity including face validity, content validity, criterion validity and construct validity (Neuman, 2003).

Face validity is considered to be the basic validity, to ensure that the questionnaire is clear and understandable (Cavana *et al.*, 2001). Content validity ensures the ability of a measure to cover the range of meanings included in a concept however criterion validity is established by the different individual score on the instrument (Cavana *et al.*, 2001; Neuman, 2003). Construct validity is a measure of how well one can obtain information from the design of the questionnaire and how logical the relationship of a group of variables (Cavana *et al.*, 2001; Neuman, 2003). Cavana *et al.* (2000) also explained there are two specific forms of construct validity, these are convergent and discriminant validity. Discriminant validity is established when, based on theory, two variables are predicted to be uncorrelated, whereas convergent validity is established when scores obtained by two different instruments measuring the same concept are highly correlated (Cavana *et al.*, 2000).

This research achieved measurement validities in the following ways. The questionnaire used in this research was reviewed by the information systems researchers to ensure a common understanding of the terms used in questionnaire. This was followed by the pilot testing, this helped to increase the face validity and the content validity. The previous instrument used in this research conducted by Fagan *et al.* (2003/2004) was also tested with discriminant validity and perceived to be

acceptable for reliability and validity. The use of the previous instrument helped ensure this research achieved validity.

3.7 Analysis of Data

The statistical analysis software Statistical Package for the Social Science (SPSS) was used to facilitate data analysis in this research. After the respondents' submitted the questionnaire, data from the web-based questionnaire could then be directly imported to statistical analysis software, SPSS, version 12.0.1 through the administration control of the Mod_Survey program.

3.7.1 Data Cleaning

The survey responses were uploaded to the School of Information Systems survey facility database. The results were directly imported data from the Mod_Survey program to SPSS, ensuring that the researcher did not have to use the direct-entry method to enter data into SPSS. However, to avoid any error and ensure the accuracy of data and the data cleaned, a manual recheck was used.

The researcher had to use the Recode option in SPSS, since a web-based questionnaire program was used, there were some outcomes that the researcher could not control. Therefore, the researcher recoded missing data or unanswered questions form -1 to 999 in SPSS.

3.7.2 Data Coding

The coding was essential to organise the collected information along with its measurement scale from the questionnaire, in order to have usable data. Cavana *et al.* (2000) suggested that organising the data variable into those measurements would increase the sophistication of the data analysis and hence more meaningful answers could be found. There are four basic types of measurement scale: nominal, ordinal, interval and ratio. The following coding scheme was used to classify the data from the web-based questionnaire.

- Nominal data is used to classify data and the numbers are allocated arbitrarily such as gender, male and female were coded as 1 and 2 respectively or respondent's major in the Faculty, Accounting and Finance, Economic, Information Systems, Management were coded as 1 through to 4 respectively.
- Ordinal data is data that rank-orders the categories in some meaning way such as student's using the computer laboratory (never, several times a semester, several times a month, once a week and several times a week) were coded as 1 through to 5 respectively or student's knowledge about computer and software (not at all, slightly, somewhat, fairly and very) were also were coded as 1 through to 5 respectively.
- Interval or scale data which allows cases to be ordered by degree according to the measurement of a variable such as in Section C, Section D, ranging from strongly disagree to strongly agree in a five-point Likert scale were coded 1 through to 5 respectively.
- Missing data were coded as 999.

3.7.3 Non-Response Rate Bias

A non-response rate bias test needs to be conducted to determine whether the respondents were representative of the entire population (Paxson, 1995). The non-response bias test was based on comparing two groups of respondents, early respondents and late respondents. The early respondents returned the questionnaires before, September 13, 2004. The late respondents returned the questionnaires from September 13 to September 24, 2004.

Mann-Whitney and Kolmogorov-Smirnov Z tests were used for this research to measure the non-response bias. The Mann-Whitney test was used to ensure the independence between the early and late respondents. Then the Kolmogorov-Smirnov Z test was used to test whether the two variables (early and late respondents) have significant difference in shape of the distributions (Coakes & Steed, 2003; SPSS, 1999). From these two tests, the researcher will be able to determine whether the two

groups can be combined for further data analysis and if they come from the same population.

3.7.4 Data Analysis

This research used two types of statistics to analyse the data, these are descriptive statistics and inferential statistics.

3.7.4.1 Descriptive Statistics

Descriptive statistics involved transformation of raw data into a form that would provide information to describe the phenomena by using numerical data. The data can be presented in graphical or tabular form and also descriptive statistics can provide the mean, median, standard deviation. This allows a mass of research data to be to read easily and ensure the results of the research are clearly and concisely summarised (Argyrous, 1996; Sprinthall, 1997;)

In this research, the descriptive statistics were used to describe the frequency and measure the central tendency for demographic information, for example, the distribution of response in term of age range, education background, the study duration in the university. The data analysed via the descriptive statistics were presented in form of pie charts, bar charts and also mean, median, standard deviation (SD) and interquartile range (IQR).

3.7.4.2 Inferential Statistics

Inferential statistics are used to test hypotheses about relationships in the population whether there are any differences between two or more groups while the statistical results permit inferences from a sample of the population (Neuman, 2003). Cavana *et al.* (2001) categorise inferential statistics as parametric and non-parametric test, “Parametric statistics is based on the assumption that the population from which the sample is normally distributed and data are collected on an interval or ratio scale” while “Non-parametric make no explicit assumption regarding the normality of distribution in the population and are used when the data are collected on a nominal or ordinal scale”. In this research the non-parametric tests were appropriated because the research data was not normally distributed.

Factor analysis was conducted to select the essential items that useful for this research. The Bivariate Correlations procedure was applied to test the hypotheses using Spearman's Rho correlation coefficient. The Spearman's Rho correlation was also used to examine the direction and significance of the bivariate relationship. The value of Spearman, r , varies between -1.00 – $+1.00$. Since r gives a precise numerical value with this range, it can express a huge variety of associational meanings (Sprinthall, 1997). Spearman's, r , can be determined the strength of the relationship based on Black (1993) suggested (Table 3.1).

Table 3.1: Interpretations for values of r

r Value (+/-)	Relative Strength
0.0-0.2	Very weak, negligible relationship
0.2-0.4	Weak, low association
0.4-0.7	Moderate association
0.7-0.9	Strong, high, marked association
0.9-1.0	Very high, very strong relationship

Source: Evaluating Social Science Research, Black 1993

3.8 Chapter Summary

The quantitative approach was applied to this research. The instrument was adapted from the previous research conducted by Fagan *et al.* (2003/2004). Data was collected through a web-based survey which distributed the URL address through the unit coordinator for Business Information Systems (BSA101), Introduction to Management (BMA101), Commercial Transactions (BFA141) and Quantitative Methods (BEA140) at University of Tasmania. The sample population was 915 students in those units. The pilot test was conducted prior to distributing the web-based survey. Ten working days after sending out the web-based survey, a follow up notice was used to increase response rate. The SPSS Windows version 12.0.1 was used for analysis data. Both descriptive and inferential statistics were employed to analyse the data and test hypotheses in this research.

Chapter 4: Analysis of Results

4.1 Introduction

This chapter will cover the data analysis and report on the results from the questionnaire described in the previous chapter. This chapter will begin with data cleaning, response rate and test of non-response bias. The descriptive analysis will report on general information about the respondents, the reliability test is presented followed by the inferential analysis and the chapter summary.

4.2 Data Cleaning

As acknowledged in previous chapter, the questionnaires' responses were uploaded to School of Information Systems survey facility database, and then the results were exported to a SPSS for Windows version 12.0.1. There was no translation error as the data is seamlessly transferred using Mod_Survey. However, there were a few questionnaires where the respondents did not complete all the answers, the researcher treated those unanswered questions as missing values (with 999) in SPSS.

4.3 Response rate

The response rate achieved in this research was 15.3%. A web-based survey was forwarded to 915 students, who currently taking one of four units, BSA101, BMA101, BFA141 and BEA140 at the University of Tasmania. However, it is important to note that this research relied heavily on a third party, as forwarding the web-based survey was done through the unit co-ordinators.

Faught and Whitten (2004) reported that web-based survey response rates can be expected to be approximately half that of any other type of data collection, such as mail survey. Neuman (2000) mentioned that a common response rate for mail surveys is 10 to 50 %.

Cavana et al. (2001) suggested, if a respondent did not answer over 25% of the questionnaire, the response should be discarded. Therefore, this research did not include 3 invalid questionnaires because a majority of the questionnaire was not completed. There were a few questionnaires that were not completed fully but since over 25% of the questionnaire was answered, the researcher handled the missing values in SPSS. As a result, 137 responses out of 915 were considered, the descriptive statistics about overall response rate (Table 4.1) are shown below.

Table 4.1: Overall Response Rate

Group of Response	Electronic survey distribution	Returned survey	Invalid questionnaires	Total usable surveys	Response Rate (%)
Early	915	92	3	89	10.05%
Late	915	48	0	48	5.25%
Total	915	140	3	137	15.3%

4.4 Test of Non – Response Bias

A non-response bias test was adopted to examine whether the 15.3% of people who responded were representative of the whole population. The test was employed to check whether the two groups of respondents, early and late, were independent (Stauber, 2000). As indicated previously, the early respondents returned the questionnaire before September 13, 2004 and the late respondents returned the questionnaires from September 13, to September 24, 2004. The distributions in early and late respondents were examined based on the following socio-economic variables, the respondent's age range, the respondent's major in the Commerce Faculty, and the respondent's duration of study in the university. The Mann-Whitney test is a non-parametric test and was employed to measure whether the two independent sample, early and late respondents, come from the same population (Coakes & Steed, 2003; SPSS, 1999). Table 4.2 show the results of the Mann-Whitney test, the significance values (p) were greater than 0.05 at a 95% confidence level for the respondent's age range ($p= 0.328$), the respondent's major in the Commerce faculty ($p=0.114$), and the

respondent's duration of study in the university ($p=0.709$). This demonstrated that there is no significant difference between the two groups of respondent, early and late respondents. In other word, the two groups of respondent were similar for socio-economic characteristics.

Table 4.2: Mann-Whitney test for Non-Response Bias (a)

	Age range of Respondents	Respondents Length of Study in University	Major of Respondents
Mann-Whitney U	1997.500	2067.000	1797.500
Wilcoxon W	3173.500	6072.000	5802.500
Z	-.979	-.374	-1.580
Asymp. Sig. (2-tailed)	.328	.709	.114

a Grouping Variable: Early/Late Respondent

The Kolmogorov-Smirnov Z was then conducted at 95% confidence level or the significance level of 0.05 to determine whether early and late respondents have significantly different distributions. The results, show in Table 4.3, that the significance value (p) was greater than 0.05, for the respondent's age range ($p=0.994$), the respondent's major in the Commerce Faculty ($p=0.263$), and the respondent's duration of study in the university ($p=1.00$). Therefore, the early and late respondents have no significant distribution differences.

Table 4.3: Kolmogorov-Smirnov Z test for Distribution

		Age range of Respondents	Respondents Length of Study in University	Major of Respondents
Most Extreme Differences	Absolute	.076	.056	.180
	Positive	.011	.046	.180
	Negative	-.076	-.056	.000
Kolmogorov-Smirnov Z		.422	.314	1.007
Asymp. Sig. (2-tailed)		.994	1.000	.263

a Grouping Variable: Early/Late Respondents

Based on the independence and distribution test, the researcher can assume that there was no bias between early and late respondents and the two groups can be treated as a single group and were representative of the population.

4.5 Descriptive Analysis

4.5.1 Demographic Results

In this section, the researcher used descriptive statistics to present background general information about the respondent's. The aim of this section is to build a profile of the respondents based on answers in Section A of the web-based questionnaire. The following aspects will be presented in the general information results:

- Age range of respondents,
- Distribution of respondents by major of study,
- Respondents' length of study in the university,
- Educational background of respondents,
- Ownership of computer by respondents,
- Use of own computer by respondents.

4.5.1.1 Age Range

Figure 4.1 shows the distribution of percentages of the age ranges of the respondents. The majority, 84%, was in the age range of 18-25 years old. There were 10% of respondents with the age range of 26-35 years old. The age ranges of 36-45 and above 45 years old were slightly different with 4% and 1% respectively. There were only 1% of the respondents who were below 18 years old.

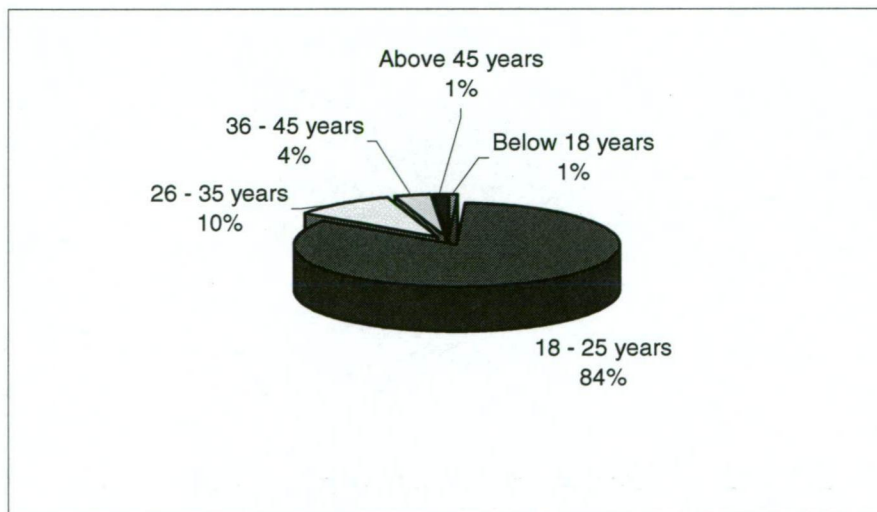


Figure 4.1: Age Range of Respondents

4.5.1.2 Distribution of Respondents by Major of Study

The respondents were asked what major they studied within the Faculty of Commerce. However, the researcher allowed the respondents to answer “other” because there might be some respondents that enrolled a unit from the Commerce Faculty as an elective unit or studied within a combined degree. Figure 4.2 showed the percentage for each major study. Most of the respondents had an Accounting and Finance major the percentage was 34%. There were 20% of the respondents with a major in Management, followed with 13% of Information Systems and 7% of Economics major. It is noted that 26% of respondents had another major. This might include students who have not decided their major.

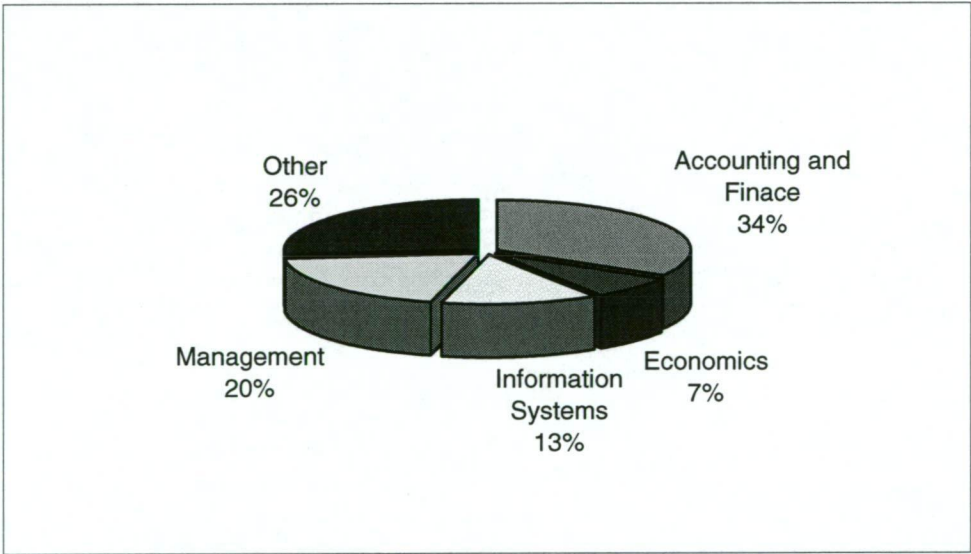


Figure 4.2: Major of Respondents

4.5.1.3 Respondents’ Length of Study in the University

Figure 4.3 shows the distribution of respondents’ length of study at the university. Of the 135 respondents, the majority of respondents, 67% had been in the university for less than one year, followed with 13% for 2 years. The percentage of the respondents who had been study in the university 1 year and 3 years varied slightly, with 9% and 7 % respectively. Lastly, 4% of the respondents that have been studying in the university for 4 years and more.

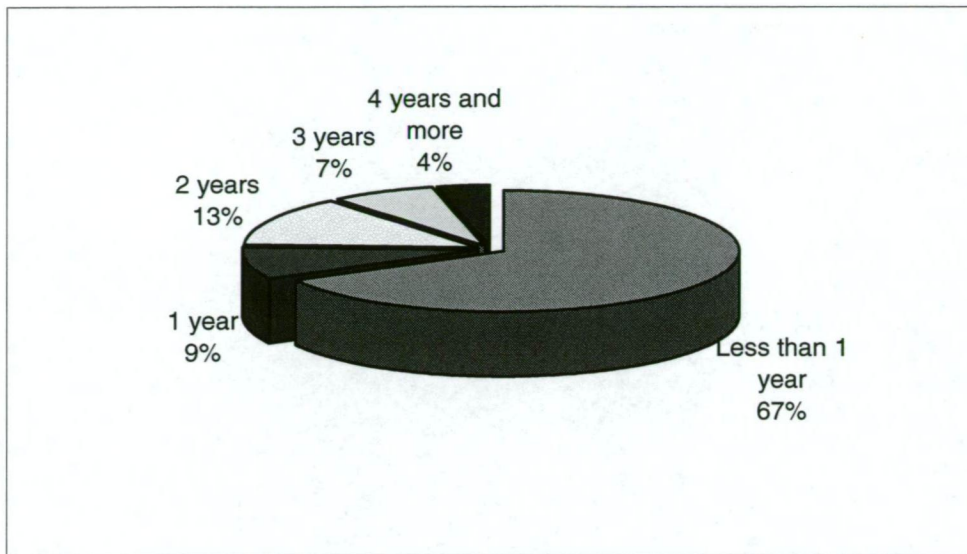


Figure 4.3: Respondents Length of Study in the University

4.5.1.4 Educational Background of Respondents

For education background, the researcher allowed the respondents to answer “other” because there might be some qualifications that respondents want to specify. Figure 4.4 shows the highest education background of the respondents. The majority of respondents, 67% indicated that they had graduated from a secondary college. There were 14% of respondents who graduated from High School and 6% graduated with a Bachelor Degree. The percentage of respondents with TAFE background was 5%, while the respondents with a Graduate Diploma and other was 4% and were the lowest percentage for any education background.

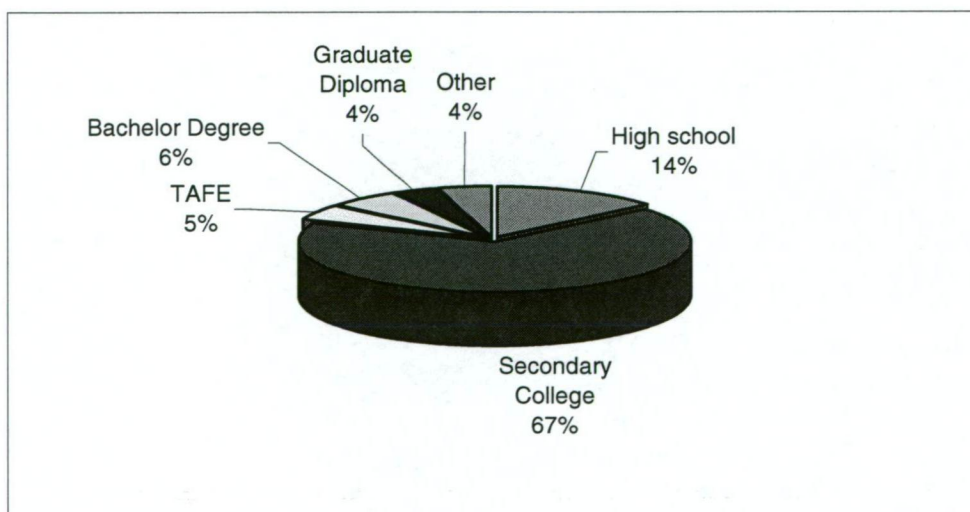


Figure 4.4: Respondents Education Background

4.5.1.5 Ownership of Computer by Respondents

Figure 4.5 shows the distribution of ownership of computer by respondents, this is where respondent were asked if they have their own computer at home. Of 135 respondents, the majority of respondents, 93% have a computer at home and only 7% do not have a computer at home.

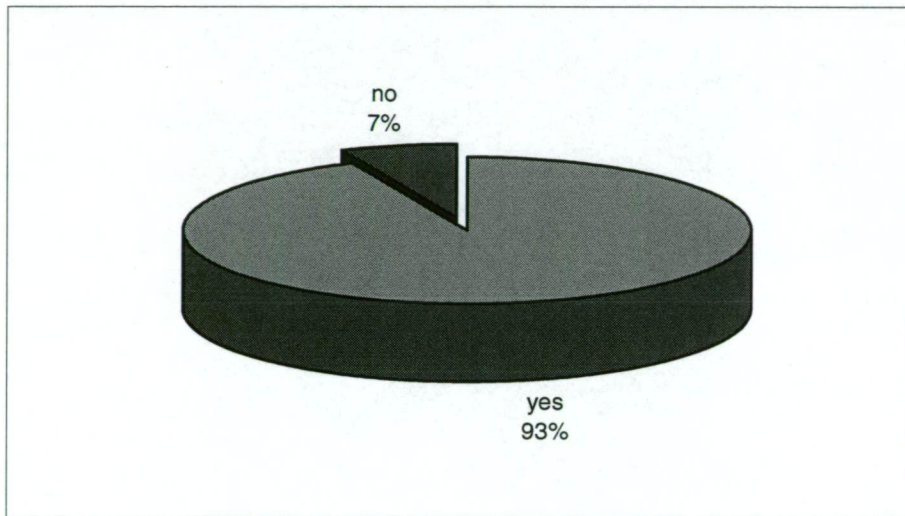


Figure 4.5: Ownership of Computer

4.5.1.6 Use of Own Computer

Figure 4.6 shows the distribution of percentages of how frequently respondent used their computer at home. The majority, 71%, use their computer at home 'everyday' while 27% use computer a 'few times a week'. The respondents using computer 'a few times a month' and 'once a week' were similar only at 1%. There was no response in 'Once a month' or 'A few times a month'.

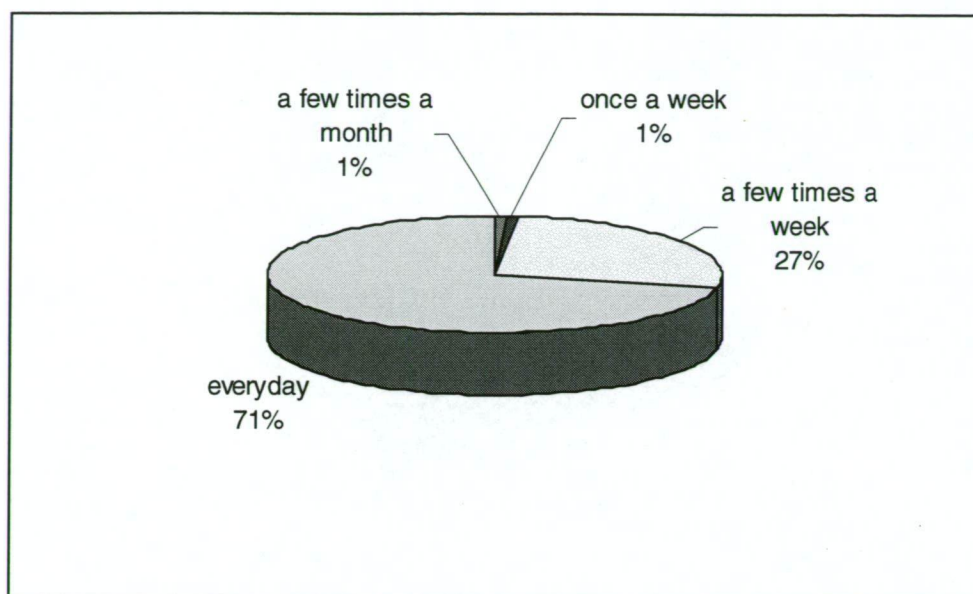


Figure 4.6: Respondents using own computer

4.5.2 Descriptive Analysis of Variables Affecting the student's use of computer technology

This section provides descriptive representation of all relevant data obtained from the web-based questionnaire. A summary of the key findings on the current variable or influence current practice is be given. The following variables will be addressed in the presentation of the results:

- Computer Usage,
- Computer Self-efficacy,
- Computer Anxiety,
- Computer Experience,
- Faculty Support.

4.5.2.1 Current Level of Computer Usage

For Computer Usage, the respondents were asked about their use of computer in the computer laboratory at the university. Three items related to computer usage were asked. Figure 4.7 shows the results of Item one, where the respondents indicated that how often do they work in the computer laboratories. Possible answers were provided and respondents were asked to select the answer which was applicable. As the result,

nearly 40% of respondents stated that they worked in the computer laboratories several times a week. Using computer laboratory once a week was next with nearly 30% while only 5.9% use computer laboratory several times a month. Nearly 15% use the computer laboratory several times a semester and 10.3% never work in the computer lab at university.

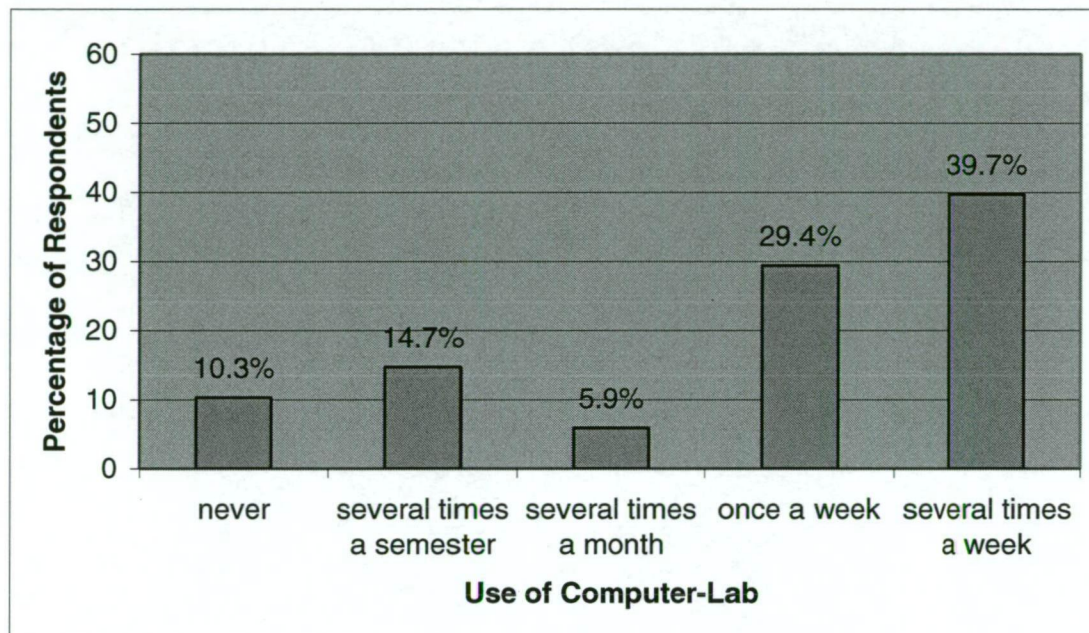


Figure 4.7: Respondent's use of the computer laboratory at university

Figure 4.8 shows the results of Item two, where the respondents indicated how many hours a week (average) that use the computer laboratory. The highest proportion of respondents (57.4%) use the computer laboratory 0 –2 hours a week. There were 23.5% of respondents used computer laboratory 3-5 hours a week. Another 7.4% of the respondents indicated they used the computer laboratory 6-8 hours a week. The percentage of respondents who used computer laboratory group 9-11 hours a week and 12 hours or more a week were similar, at 5.9 % each.

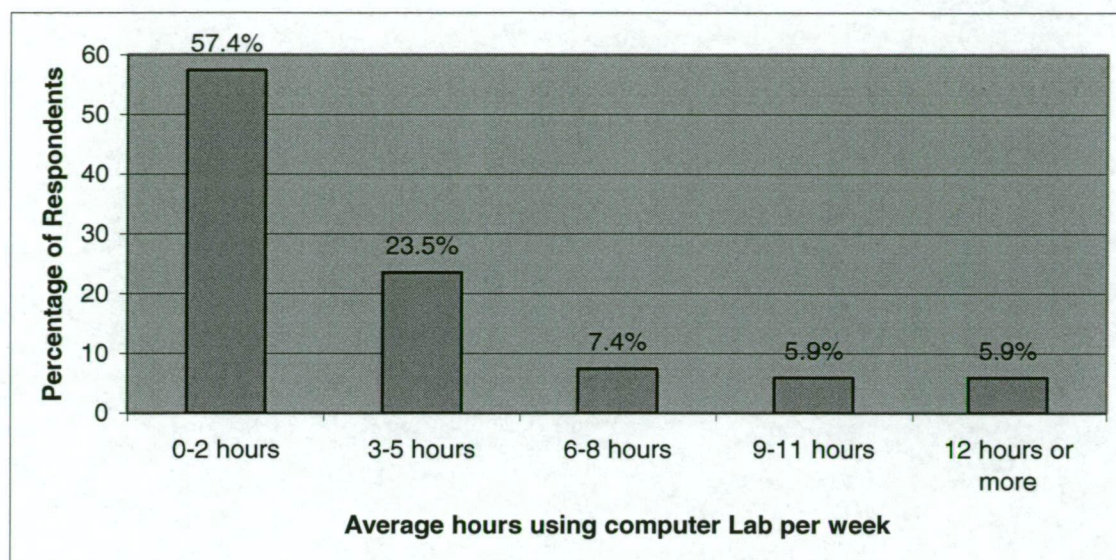


Figure 4.8: Respondents' average hours using the computer laboratory per week

Figure 4.9 shows the results of Item three, where the respondents indicated the percentage of their class assignment which was completed in the computer laboratories. The majority of the respondents (47.4%) worked on their class assignments less than 10% in computer laboratory. 16.2% of respondents worked on their class assignment 10-25%, 14.7% of respondents worked on their class assignment 51-70% while 11.8 % of respondents worked on their class assignment 26-50%. The lowest percentage of respondents (9.6%) who worked on their class assignment in the computer laboratory use for 71-100% of the time.

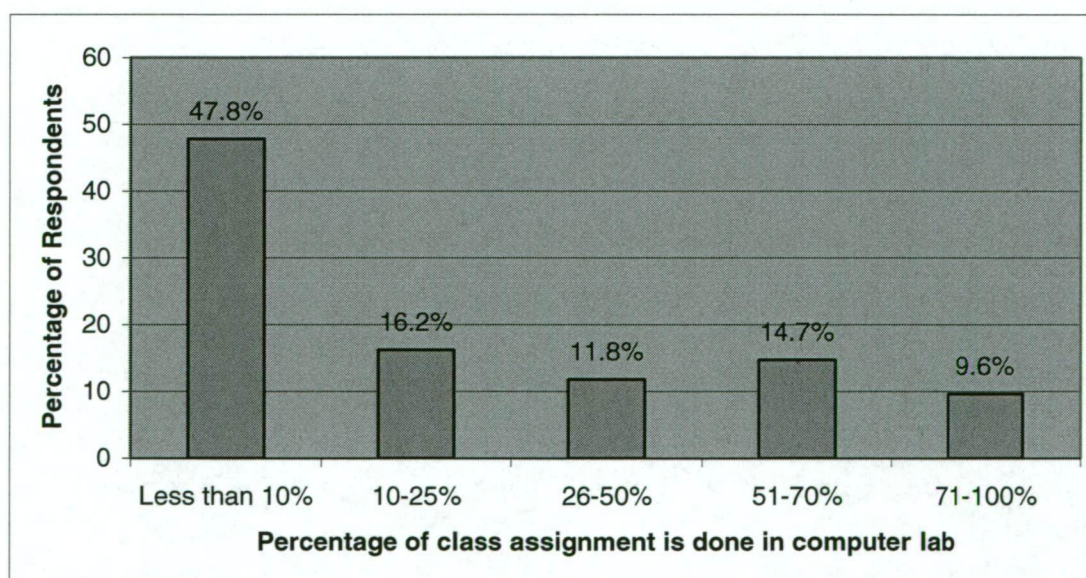


Figure 4.9: Respondents' percentage of class assignments is done in computer laboratory

4.5.2.2 Current Level of Computer Self-efficacy

The level of computer self-efficacy was identified through five statements with a 5-point Likert-scale, where 1 represented the lowest level of computer self-efficacy (strongly disagree) to 5 that represented the highest level of computer self-efficacy (strongly agree). To statistically identify the level of the computer self-efficacy, mean and median values were computed to measure the central tendency of data, and then the variation of each statement of agreement was measured by the standard deviation and inter-quartile range value (IQR). Table 4.4 shows the mean, standard deviation, median and IQR for computer self-efficacy

As can be seen from Table 4.4, the respondents indicated they positively agree with the statements on computer self-efficacy, with the average above 4. The highest level of computer self-efficacy was in “I feel confident working on personal computer” (mean = 4.61, SD = 0.66) while the lowest level of computer self-efficacy was in “I feel confident calling up a data file to view on the monitor screen” (mean = 4.42, SD = 0.77). However, as both had high standard deviation, conclusions cannot be drawn therefore, the middle value (median) would best describe the results for a skewed distribution. It can be seen from the Table 4.4 when the median has a high value and the low interquartile range (IQR) means that the respondents agree with the statements. The Interquartile range (IQR) measures the range for the middle 50 percent of the data. This shows those responses that are extreme. For instance, the statement that “I feel confident entering and saving data into a file” achieved a median of 5 and an IQR of 1.

Table 4.4: Levels of Computer Self-efficacy of Commerce student at university of Tasmania

Statements	Mean	Std. Deviation	Median	IQR
I feel confident calling up a data file to view on the monitor screen.	4.42	0.77	5	1
I feel confident entering and saving data into a file.	4.50	0.73	5	1
I feel confident escaping/exiting from a program or software.	4.54	0.68	5	1
I feel confident working on personal computer.	4.61	0.66	5	1
I feel confident using a printer to make a hardcopy of my work.	4.56	0.72	5	1
Overall	4.53	0.63	5	1

Scale: 1= Strongly Disagree, 2= Disagree, 3= Neutral, 4= Agree, 5= Strongly Agree.

4.5.2.3 Current Level of Computer Anxiety

The level of Computer Anxiety was identified through 5 statements with a 5 point Likert-scale, where 1 represents the lowest level of computer anxiety (strongly disagree) to 5 that represented the highest level of computer anxiety (strongly agree). To statistically identify the level of the computer anxiety, mean and median values were computed to measure the central tendency of data, and then the variation of each statement of agreement was measured by the standard deviation and inter-quartile range value (IQR). Table 4.5 shows the mean, standard deviation, median and IQR for computer anxiety.

The results in Table 4.5 show the mean of each Computer Anxiety statement ranged from 1.47 to 1.84. Most respondents disagreed with the statements indicated below. The highest level of computer anxiety was “I worry about making mistakes on a

computer” (mean = 1.84, SD = 1.02). This statement had the highest median of 2 and an IQR of 1. The lowest level of computer anxiety was in “I try to avoid using a computer whenever possible” (mean = 1.47, SD = 0.74).

Table 4.5: Levels of Computer Anxiety of Commerce student at university of Tasmania

Statements	Mean	Std. Deviation	Median	IQR
I try to avoid using a computer whenever possible.	1.47	0.74	1	1
I worry about making mistakes on a computer.	1.84	1.02	2	1
I feel overwhelmed whenever I am working on a computer.	1.62	0.89	1	1
I feel anxious whenever I am using a computer.	1.58	0.87	1	1
I feel tense whenever working on a computer.	1.61	0.88	1	1
Overall	1.62	0.73	1.20	1.20

Scale: 1= Strongly Disagree, 2= Disagree, 3= Neutral, 4= Agree, 5= Strongly Agree.

4.5.2.4 Current Level of Computer Experience

For Computer Experience, the respondents were asked about their overall level of their computer experience. Three Items were asked that were related to computer experience. Figure 4.10 shows the overall results for Item 4, this is where the respondents indicated their overall computer literacy. Lists of possible answers were provided and respondents were asked to select one of those answers. The highest percentage, 37.2%, described themselves having an average level of computer literacy followed by above average level of computer literacy with 36.5%. There were 20.4% of respondents who described themselves as having a high level of computer literacy.

Below average computer literacy and low computer literacy were different, with 3.6% and 2.2% respectively.

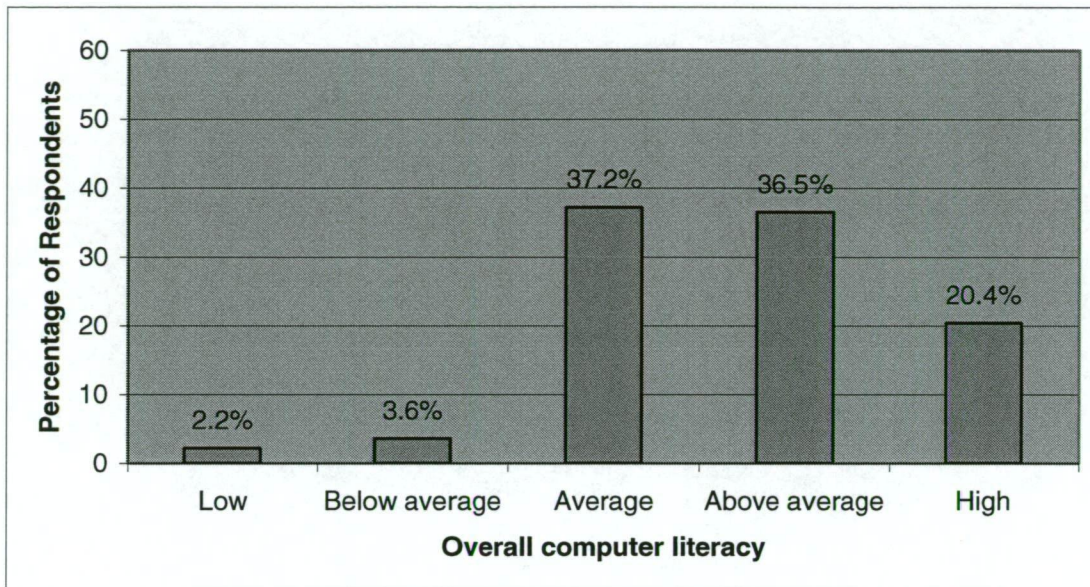


Figure 4.10: Respondents' overall computer literacy

Figure 4.11 shows the overall results of Item two, this is where the respondents indicated their past computer experience. Most of the respondents (40.9%) had used computers for more than 10 years, followed by 35.8% who had of 7-9 years experience. There were 19% of respondents who had used computers for 4-6 years. Only 4.4% of respondents indicated that they used computers for 1-3 years. No respondents were reported as having used computers for less than 1 year.

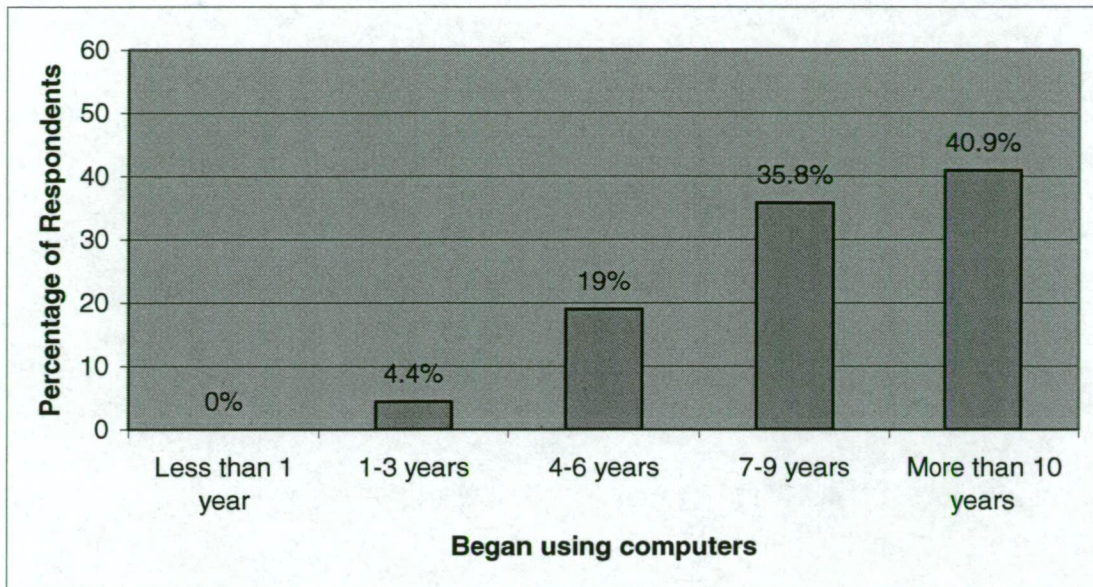


Figure 4.11: Respondents' begin using computers

Figure 4.12 shows the overall results for Item three, where the respondents indicated their level of knowledge about computers and software. There were 35% of respondents who indicated their knowledge as 'somewhat'. This was followed by 32.1% who indicated their level of knowledge as 'fairly'. 17.5% of respondents described themselves as very knowledgeable with regards to computers and software. There were 13.9% of the respondents who had 'slightly' knowledge about computers and software. Only 1.5% described themselves as 'not at all' with regards to knowledge about computers and software.

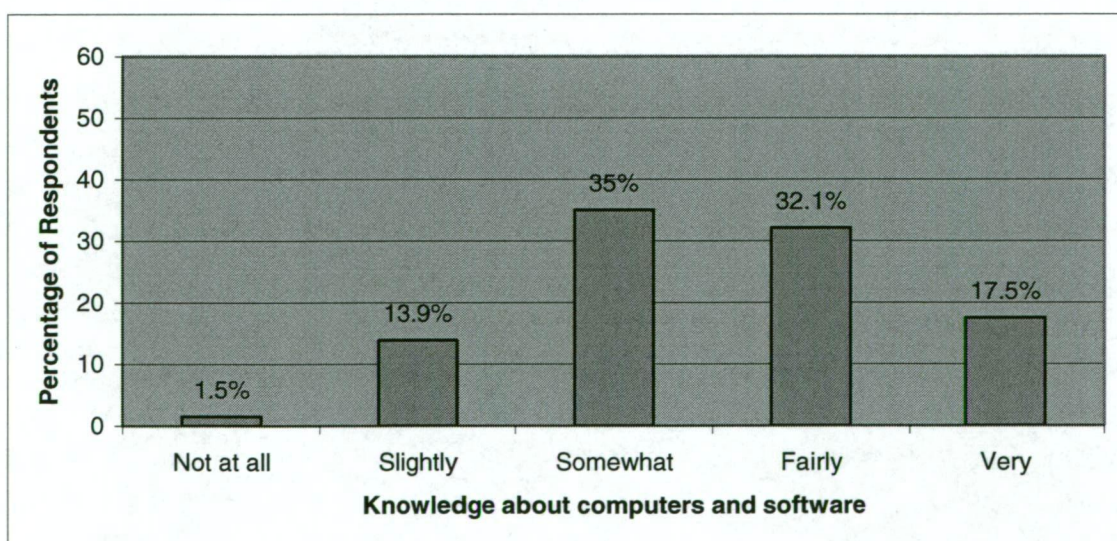


Figure 4.12: Respondents' knowledge about computer and software

4.5.2.5 Current Level of Faculty Support

The level of Faculty support was identified through 23 statements with a 10 point Likert-scale, where 1 represented the lowest level of Faculty support (Poor), 5 represented a moderate level of Faculty support (Moderately), to 10 that represented the highest level of Faculty support (Excellent). To statistically identify the level of the Faculty Support, mean and median values were computed to measure the central tendency of data. The variation of agreement was measured by the standard deviation and inter-quartile range value (IQR). Table 4.6 shows the mean, standard deviation, median and IQR for Faculty support.

The “Numbers of hours open” statement is reported to have the highest level of Faculty support with a mean of 7.47, and a standard deviation of 2.407. The lowest level of Faculty support was in “Provided knowledge about software” with a mean of 5.66 and a standard deviation of 2.150. The median of Faculty support in “Numbers of hours open” was at 8 with a IQR of 5, while “Provided knowledge about software” had a median value of 5 with a IQR of 2. Respondents had the view that the Faculty support was above average.

Table 4.6: Levels of Faculty support of Commerce student at the University of Tasmania

Statements	Mean	Std.	Median	IQR
Availability of equipment when needed.	6.39	2.31	6	3
Waiting time for a computer to be available.	5.70	2.59	5	4
Total number of computers.	5.96	2.43	6	4
Computer hardware up to date.	6.93	2.25	7	4
Assistance in equipment use.	5.79	2.27	6	4
Faculty's attitude toward students.	7.01	2.09	7	3
Support in assisting with problems.	6.42	2.09	6	3
Provided knowledge about software.	5.66	2.15	5	2
Response time to problems.	6.41	1.96	6	3
Student orientation provided.	5.90	2.16	6	3
Ability to concentrate on work.	6.21	2.16	6	3
Quite working environment.	6.39	2.29	7	3
Confidentiality of work.	6.70	2.43	7	4
Numbers of hours open.	7.47	2.41	8	5
Evening hours/closing time.	7.09	2.44	8	4
Open when needed.	7.26	2.44	8	5
Hours of operation on weekends.	6.81	2.56	7	4
Full/complete software functionality.	6.65	2.15	7	3
Working order of computer.	6.59	2.28	7	3
Maintenance of equipment.	6.65	2.23	7	3
Reliability of equipment.	6.58	2.25	7	3
Reliability of software.	6.88	2.26	7	4
Dependability of hardware.	6.67	2.23	7	3
Overall	6.52	1.72	6.65	2.76

Scale: 1 = Poor, 5 = Moderately, 10 = Excellent.

4.6 Inferential Statistics

This section presents the results of the inferential analysis that aim to test the research hypotheses. Factor analysis, reliability and normality test are presented.

4.6.1 Factor Analysis

Factor analysis is a data reduction technique that can be help to reduce a large number of variables to a meaningful, interpretable and manageable set of factors (Cavana et al., 2001; Coakes and Steed, 2003). Factor analysis helps to check the way in which each respondent completed the items and compares this with the way in which every other respondent completed each and every item. The analysis then indicates which items can be grouped as a component (Cavana et al., 2001). The researcher decided to conduct this test on the original 39-item instrument before any other further data analysis was tested to helping determine whether items are tapping into same variable.

However, there are a few assumptions and practical considerations regarding the application of factor analysis, these are:

- The number of sample or respondents should not be less than 100, but more than 200 are preferable (Coakes and Steed, 2003; Foster, 2001),
- At least twice as many respondents or samples as Items are required, which both the number of respondents or samples and the ration of respondents to Items should be as large as possible (Foster, 2001), and
- There should be various abilities or measures being studied (Foster, 2001).

As this research received 137 respondents and there was 39 Items that were considered, as a result the ratio of respondents to Items equal 3.5. Therefore, the factor analysis can be used in this research. A Principal Components method for factor extraction was conducted in this research. This research was found that the Bartlett test of sphericity was at a value of 4716.74 with a significance level of 0.00 and that the Kaiser-Meyer-Olkin measure of sampling adequacy is far greater than 0.6 at 0.87 (see Appendix D). The intercorrelation matrix contained adequate common variance to proceed with factor analysis. Table 4.7 demonstrated the 36 items instrument were extracted from the 39 original items by using the factor analysis test. Factor analysis indicated there were six components, these were computer self-

efficacy, computer anxiety, computer usage and faculty support. However, the test showed computer self-efficacy and computer experience could have been considered as one component, the researcher decided to use computer experience as a separate component in this research as computer experience was a main construct in the hypotheses used by Fagan et al. (2003/2004). This research replicated the research undertaken by Fagan et al. (2003/2004) so it is important to test their hypothesis. The factor analysis test also generated three sets of Faculty support so, that faculty support will now be considered as three different component, assistance dimensions as Support (1), access and hours of operation as Support (2), and reliability dimensions as Support (3). The 36 items indicated below were taken into consideration for the remainder of the data analysis in this research. Table 4.8 is a summary the number of 36 items listed in each component.

Table 4.7: Factor Analysis – 36 Item Instrument

Items	Component						
	Computer Self-efficacy	Computer Anxiety	Computer Experience	Computer Usage	Support (1)	Support (2)	Support (3)
Effic02	0.90						
Effic03	0.85						
Effic05	0.82						
Effic01	0.82						
Effic04	0.80						
Anxiet05		0.82					
Anxiet04		0.81					
Anxiet03		0.68					
Anxiet02		0.67					
Anxiet01		0.52					
Exerp1			0.67				
Exerp3			0.55				
Usage2				0.86			
Usage3				0.86			
Usage1				0.77			
Support10					0.84		
Support08					0.80		
Support05					0.70		
Support07					0.70		
Support09					0.62		
Support11					0.53		
Support06					0.51		
Support17						0.84	
Support15						0.82	
Support16						0.80	
Support14						0.78	
Support02						0.74	
Support03						0.73	
Support01						0.65	
Support21							0.90
Support20							0.89
Support23							0.87
Support19							0.84
Support22							0.84
Support04							0.71
Support18							0.65

Table 4.8: Summary of The 25-items Instrument

Variables	Question Numbers	Number of Items
Computer usage	Q1-Q3, in section B	3
Computer self-efficacy	Q1-Q5, in section C	5
Computer anxiety	Q1-Q5, in section D	5
Computer experience	Q1 and Q3 in section E	2
Faculty support (1)	Q5-Q11, in section F	7
Faculty support (2)	Q1-Q3, Q14-Q17, in section F	7
Faculty support (3)	Q4, Q18 – Q23, in section F	7
Total		36

4.6.2 Reliability Tests

According to Foster (2001) reliability refers to the consistency of the results, therefore a data reliability test must be conducted before further data analysis can be undertaken. One of the most commonly methods test reliability is by Cronbach's alpha (Coakes & Steed, 2003; SPSS, 1999). Therefore, the Cronbach's alpha was employed to test the internal consistency between the variables in this research.

Table 4.9 shows the reliability of seven variables, which were assessed for internal consistency through sub-items in the questionnaire. In general, a reliability of 0.8 is highly acceptable (SPSS, 1999), while Cavana et al. (2001) suggest that reliabilities of a range of 0.6 or greater ranges are acceptable. As can be seen from the results in Table 4.9, Cronbach's alpha for all seven variables ranged from 0.809 to 0.962. The Cronbach's alpha reliability test confirmed the reliability of the component variables, in other words, the reliability of the instrument can be accepted.

Table 4.9: Cronbach's alpha reliability coefficients

Variables	Items	Cronbach's alpha
Computer Usage	3	0.81
Computer Self-efficacy	5	0.93
Computer Anxiety	5	0.88
Computer Experience	2	0.83
Faculty Support (1)	7	0.91
Faculty Support (2)	7	0.93
Faculty Support (3)	7	0.96

4.6.3 Normality Tests

According to Coakes and Steed (2003) the assumption of normality is a prerequisite for many inferential statistical techniques, therefore the Kolmogorov-Smirnov normality distribution tests was employed in this research to test the five variables for normal distribution before testing the proposed hypotheses. Table 4.10 shows the results of normality test for five variables using Kolmogorov-Smirnov test. According to Coakes and Steed (2003), if the significance level is greater than 0.05, then normality is assumed. From Table 4.10, the normality of most variables cannot be assumed because the significance values lower than 0.05 ($p < 0.05$). The only exception is Faculty support 1 (assistance) and Faculty support 2 (access and hours of operation) can be assumed. Therefore, parametric statistics cannot be used for analyzing the data as the majority of data does not have a normal distribution.

Table 4.10: Test of Normality

Variables	Kolmogorov-Smirnov ^a		
	Statistic	df	Sig.
Computer Usage	0.145	136	0.000
Computer Self-efficacy	0.307	137	0.000
Computer Anxiety	0.267	137	0.000
Computer Experience	0.129	137	0.000
Faculty Support (1)	0.064	131	0.200*
Faculty Support (2)	0.068	134	0.200*
Faculty Support (3)	0.092	133	0.007

* This is a lower bound of the true significance.

a. Lilliefors Significance Correction

4.6.4 Hypotheses testing

This section presents the results of the inferential statistical technique to test the nine hypotheses proposed in Chapter One. Non-parametric tests are appropriate to do the inferential analysis within this research as the distribution of most variables differed from normal distribution. This was shown in Table 4.10 and also the data collected used a nominal or ordinal scale (Cavana et al., 2001). A bivariate Correlation test was used to examine the relationship between two variables in each hypothesis, specifically the Spearman's Rho correlation was employed.

Hypothesis 1:

H₀1: Computer self-efficacy is not related to Computer Usage

H_a1: Computer self-efficacy is related to Computer Usage

Table 4.11 shows the result from Hypothesis 1, which tested the relationship between computer self-efficacy and computer usage. The outcome of Spearman Coefficient test showed that the p value was below 0.01 at 99% confidence level ($p = 0.007$). A negative relationship existed between the two variables with a correlation coefficient, r , value of -0.211 . Therefore, the null hypothesis was rejected. That is, there is a

significant negative relationship between Computer self-efficacy and Computer usage.

Table 4.11: Spearman Rho's Correlation between Computer Self-efficacy and Computer Usage

Correlation Coefficient	-0.211**
Sig. (1-tailed)	0.007
Direction	Negative
N of Valid Case	136

** Correlation is significant at the 0.01 level (1-tailed)

Hypothesis 2:

H₀2: Computer self-efficacy is not related to Computer Anxiety

H_a2: Computer self-efficacy is related to Computer Anxiety

Table 4.12 shows the result from Hypothesis 2, which tested the relationship between computer self-efficacy and computer anxiety. The outcome of Spearman Coefficient test showed that the p value was below 0.01 at 99% confidence level ($p = 0.000$). A negative relationship existed between the two variables with a correlation coefficient, r , value of -0.211 . Therefore, the null hypothesis was rejected. That is, there is a significant negative relationship between computer self-efficacy and computer anxiety.

Table 4.12: Spearman Rho's Correlation between Computer Self-efficacy and Computer Anxiety

Correlation Coefficient	-0.655**
Sig. (1-tailed)	0.000
Direction	Negative
N of Valid Case	137

** Correlation is significant at the 0.01 level (1-tailed)

Hypothesis 3:

H₀3: Computer Anxiety is not related to Computer Usage

H_a3: Computer Anxiety is related to Computer Usage

Table 4.13 shows the result from Hypothesis 3, which tested the relationship between computer anxiety and computer usage. The outcome of Spearman Coefficient test showed that the *p* value was below 0.05 at 95% confidence level (*p* = 0.000). A positive relationship existed between the two variables with a correlation coefficient, *r*, value of 0.150. Therefore, the null hypothesis was rejected. That is, there is a significant positive relationship between computer anxiety and computer usage.

Table 4.13: Spearman Rho’s Correlation between Computer Anxiety and Computer Usage

Correlation Coefficient	0.150*
Sig. (1-tailed)	0.041
Direction	Positive
N of Valid Case	136

*Correlation is significant at the 0.05 level (1-tailed)

Hypothesis 4:

H₀4: Computer Experience is not related to Computer self-efficacy

H_a4: Computer Experience is related to Computer self-efficacy

Table 4.14 shows the result from Hypothesis 4, which tested the relationship between computer experience and computer self-efficacy. The outcome of Spearman Coefficient test showed that the *p* value was below 0.01 at 99% confidence level (*p* = 0.000). A positive relationship existed between the two variables with a correlation coefficient, *r*, value of 0.559. Therefore, the null hypothesis was rejected. In other word, there is a significant positive relationship between computer experience and computer self-efficacy.

Table 4.14: Spearman Rho's Correlation between Computer Experience and Computer self-efficacy

Correlation Coefficient	0.559**
Sig. (1-tailed)	0.000
Direction	Positive
N of Valid Case	137

**Correlation is significant at the 0.01 level (1-tailed)

Hypothesis 5:

H₀5: Computer Experience is not related to Computer Anxiety

H_a5: Computer Experience is related to Computer Anxiety

Table 4.15 shows the result from Hypothesis 5, which tested the relationship between computer self-efficacy and computer anxiety. The outcome of Spearman Coefficient test showed that the p value was below 0.01 at 99% confidence level ($p = 0.000$). A negative relationship existed between the two variables with a correlation coefficient, r , value of -0.534 . Therefore, the null hypothesis was rejected. That is, there is a significant negative relationship between computer experience and computer anxiety.

Table 4.15: Spearman Rho's Correlation between Computer Experience and Computer Anxiety

Correlation Coefficient	-0.534**
Sig. (1-tailed)	0.000
Direction	Negative
N of Valid Case	137

** Correlation is significant at the 0.01 level (1-tailed)

Hypothesis 6:

H₀6: Computer Experience is not related to Computer Usage

H_a6: Computer Experience is related to Computer Usage

Table 4.16 shows the result from Hypothesis 6, which tested the relationship between computer experience and computer usage. The outcome of Spearman Coefficient test showed that the p value was above 0.05 at 95% confidence level ($p = 0.461$) and correlation coefficient, r , value was -0.080 . Therefore, the null hypothesis was accepted. That is, there is no relationship between computer experience and computer usage.

Table 4.16: Spearman Rho's Correlation between Computer Experience and Computer Usage

Correlation Coefficient	-0.080
Sig. (1-tailed)	0.461
Direction	Negative
N of Valid Case	136

Hypothesis 7:

H₀7: Faculty Support is not related to Computer self-efficacy

H_a7: Faculty Support is related to Computer self-efficacy

From the factor analysis test, it was found that there existed three dimensions of faculty support as Support 1 is assistance, Support 2 is access and hours of operation, and Support 3 is reliability. Therefore, from this point the researcher will test the rest of hypothesis with three faculty support components.

Table 4.17, shows the result Hypothesis 7, which tested the relationship between faculty support 1 and computer self-efficacy. The outcome of Spearman Coefficient test showed that the p value was below 0.05 at 95% confidence level ($p = 0.028$). A positive relationship existed between the two variables with a correlation coefficient,

r , value of 0.168. Therefore, the null hypothesis was rejected. That is, there is a significant positive relationship between faculty support 1 (assistance) and computer self-efficacy.

Table 4.17: Spearman Rho's Correlation between Assistance Support and Computer self-efficacy

Correlation Coefficient	0.168*
Sig. (1-tailed)	0.028
Direction	Positive
N of Valid Case	131

*Correlation is significant at the 0.05 level (1-tailed)

Table 4.18 shows the result from hypothesis 7, which tested the relationship between faculty support 2 and computer self-efficacy. The outcome of Spearman Coefficient test showed that the p value was below 0.01 at 99% confidence level ($p = 0.000$). A positive relationship existed between the two variables with a correlation coefficient, r , value of 0.315. Therefore, the null hypothesis was rejected. That is, there is a significant positive relationship between faculty support 2 (access and hours of operation) and computer self-efficacy.

Table 4.18: Spearman Rho's Correlation between Access and Hours of Operation Support and Computer self-efficacy

Correlation Coefficient	0.315**
Sig. (1-tailed)	0.000
Direction	Positive
N of Valid Case	134

**Correlation is significant at the 0.01 level (1-tailed)

Table 4.19 shows the result from hypothesis 7, which tested the relationship between faculty support 3 and computer self-efficacy. The outcome of Spearman Coefficient test showed that the p value was below 0.05 at 95% confidence level ($p = 0.042$). A positive relationship existed between the two variables with a correlation coefficient, r , value of 0.151. Therefore, the null hypothesis was rejected. That is, there is a

significant positive relationship between faculty support 3 (reliability) and computer self-efficacy.

Table 4.19: Spearman Rho's Correlation between Reliability Support and Computer self-efficacy

Correlation Coefficient	0.151*
Sig. (1-tailed)	0.042
Direction	Positive
N of Valid Case	133

*Correlation is significant at the 0.05 level (1-tailed)

Hypothesis 8:

H₀8: Faculty Support is not related to Computer Anxiety

H_a8: Faculty Support is related to Computer Anxiety

Table 4.20 shows the result from Hypothesis 8, which tested the relationship between faculty support 1 and computer anxiety. The outcome of Spearman Coefficient test showed that the p value was below 0.01 at 99% confidence level ($p = 0.009$). A negative relationship existed between the two variables with a correlation coefficient, r , value of -0.205 . Therefore, the null hypothesis was rejected. That is, there is a significant negative relationship between faculty support 1(assistance) and computer anxiety.

Table 4.20: Spearman Rho's Correlation between Assistance Support and Computer Anxiety

Correlation Coefficient	-0.205**
Sig. (1-tailed)	0.009
Direction	Negative
N of Valid Case	131

**Correlation is significant at the 0.01 level (1-tailed)

Table 4.21 shows the result from Hypothesis 8, which tested the relationship between faculty support 2 and computer anxiety. The outcome of Spearman Coefficient test showed that the p value was below 0.01 at 99% confidence level ($p = 0.002$). A positive relationship existed between the two variables with a correlation coefficient, r , value of -0.249 . Therefore, the null hypothesis was rejected. That is, there is a significant negative relationship between faculty support 2 (access and hours of operation) and computer anxiety.

Table 4.21: Spearman Rho's Correlation between Access and Hours of Operation Support and Computer Anxiety

Correlation Coefficient	-0.249**
Sig. (1-tailed)	0.002
Direction	Negative
N of Valid Case	134

**Correlation is significant at the 0.01 level (1-tailed)

Table 4.22 shows the result from Hypothesis 8, which tested the relationship between faculty support 3 and computer self-efficacy. The outcome of Spearman Coefficient test showed that the p value was above 0.05 at 95% confidence level ($p = 0.101$) and correlation coefficient, r , value was -0.111 . Therefore, the null hypothesis was accepted. That is, there is no relationship between faculty support 3 (reliability) and computer anxiety.

Table 4.22: Spearman Rho's Correlation between Reliability Support and Computer Anxiety

Correlation Coefficient	-0.111
Sig. (1-tailed)	0.101
Direction	Negative
N of Valid Case	133

Hypothesis 9:

H₀9: Faculty Support is related to Computer Usage

H_a9: Faculty Support is related to Computer Usage

Table 4.23 shows the result from Hypothesis 9, which tested the relationship between faculty support 1 and computer usage. The outcome of Spearman Coefficient test showed that the p value was above 0.05 at 95% confidence level ($p = 0.239$) and correlation coefficient, r , value was 0.63. Therefore, the null hypothesis was rejected. That is, there is no relationship between faculty support 1 (assistance) and computer usage.

Table 4.23: Spearman Rho's Correlation between Assistance Support and Computer Usage

Correlation Coefficient	0.063
Sig. (1-tailed)	0.239
Direction	Positive
N of Valid Case	130

Table 4.24 shows the result from Hypothesis 9, which tested the relationship between faculty support 2 and computer usage. The outcome of Spearman Coefficient test showed that the p value was above 0.05 at 95% confidence level ($p = 0.431$) and correlation coefficient, r , value was 0.015. Therefore, the null hypothesis was rejected. That is, there is no relationship between faculty support 2 (access and hour of operation) and computer usage.

Table 4.24: Spearman Rho's Correlation between Access and Hours of Operation Support and Computer Usage

Correlation Coefficient	0.015
Sig. (1-tailed)	0.431
Direction	Positive
N of Valid Case	133

Table 4.25 shows the result from Hypothesis 9, which tested the relationship between faculty support 3 and computer usage. The outcome of Spearman Coefficient test showed that the p value was above 0.05 at 95% confidence level ($p = 0.447$) and correlation coefficient, r , value was -0.012 . Therefore, the null hypothesis was rejected. That is, there is no relationship between faculty support 3 (reliability) and computer usage.

Table 4.25: Spearman Rho's Correlation between Reliability Support and Computer Anxiety

Correlation Coefficient	-0.012
Sig. (1-tailed)	0.447
Direction	Negative
N of Valid Case	132

4.6.4.1 Hypotheses results summary

Table 4.26 shows the summary of hypotheses results using the Spearman's Rho correlation test for examining the relationship between two variables. The Correlation Coefficient and direction of the relationship between two variables is reported. Overall, seven null hypotheses were rejected as the p value was lower than 0.05. There were four hypotheses that had negative relationships while three hypotheses had positive relationships.

Table 4.26: Summary of Spearman's Rho Correlation test for relationship of variables

Null hypotheses	Variables	N	Direction	Spearman's Rho		Result
				Correlation Coefficient	Sig. (1-tailed)	
H ₀₁	Computer self-efficacy and computer usage	136	Negative	-0.21**	0.01	Reject
H ₀₂	Computer self-efficacy and computer anxiety	137	Negative	-0.66**	0.00	Reject
H ₀₃	Computer anxiety and computer usage	136	Positive	0.15*	0.04	Reject
H ₀₄	Computer experience and computer self-efficacy	137	Positive	0.56**	0.00	Reject
H ₀₅	Computer experience and computer anxiety	137	Negative	-0.53**	0.00	Reject
H ₀₆	Computer experience and computer use	136	Negative	-0.08	0.46	Accept
H ₀₇	Faculty support 1 and computer self-efficacy	131	Positive	0.17*	0.03	Reject
	Faculty support 2 and computer self-efficacy	134	Positive	0.32**	0.00	Reject
	Faculty support 3 and computer self-efficacy	133	Positive	0.15*	0.04	Reject
H ₀₈	Faculty support 1 and computer anxiety	131	Negative	-0.21**	0.01	Reject
	Faculty support 2 and computer anxiety	134	Negative	-0.25**	0.00	Reject
	Faculty support 3 and computer anxiety	133	Negative	-0.11	0.10	Accept
H ₀₉	Faculty support 1 and computer usage	131	Positive	0.06	0.24	Accept
	Faculty support 2 and computer usage	134	Positive	0.01	0.43	Accept
	Faculty support 3 and computer usage	133	Negative	-0.01	0.45	Accept

*Correlation is significant at the 0.05 level (1-tailed)

**Correlation is significant at the 0.01 level (1-tailed)

Note: p value < 0.05 is significant and results in the null hypothesis be reject

4.7 Chapter Summary

This chapter presented the data obtained from the survey. This research achieved a 15.3% response rate, a non-response bias test was performed on the data which was then grouped. Both descriptive and inferential statistics were employed to analyse the data using SPSS. A factor analysis test was conducted to confirm the important variables related to this research. After the factor analysis test, the reliability of data was assessed with a Cronbach's Alpha of between 0.809-0.962. This level of reliability was considered acceptable. A normality test using the Kolmogorov-Smirnov test was undertaken on the data collected and it was found that the data did not have a normal distribution. A non-parametric test was therefore employed to test the hypotheses. Spearman's correlation was used to test the nine hypotheses. The results found that there was no relationship between computer usage and computer experience and between Faculty support and computer usage. However, it was found, there is a positive relationship between computer self-efficacy and computer experience, computer self-efficacy and Faculty support.

Chapter 5: Discussion and Conclusion

5.1 Introduction

The aim of this chapter is to discuss the findings from the Chapter Four. The chapter includes a discussion of the response rate, reliability, general finding and a detailed discussion of the variables analysis.

5.2 Response and Reliability

This survey achieved a response rate of 15.3 %. A web-based survey was distributed to the entire population (915 students). Faught and Whitten (2004) reported that web-based survey response rates can be expected to be approximately half of other types of data collection such as mail-paper survey. Neuman (2000) mentioned that a common response rate for mail surveys is 10 to 50 %. Tse *et al.* (1995) reported a web-based survey with a response rate of 6% in their research. Smith (1997) achieved a response rate of 8% and 13.3% respectively for e-mail and web site survey methods. Liu *et al.* (2001) also received a response rate of 18% in their web-based survey whilst Patrick *et al.* (1995) gained a 8.9 % response rate for their web-based survey. Generally, the response rate of web-based surveys depends on the type of population (Liu *et al.*,2001; Carini *et al.*,2003). Moreover, web-based survey response rates may vary significantly and be quite low. However, it noted that this research have to rely on a third party, due to ethical constraints, this may have affected the response rate for this research.

A non-response bias test was conducted in order to check whether the early and late respondents were independent. This research found that there were no differences between two groups so, the data from early respondent and late respondent can grouped together and the remaining data analysis was performed on a combined data set. Before testing the hypotheses, the researcher ran a confirmatory factor analysis (principal components, varimax rotation) on the all the main variables.

The rotated factor matrix indicated that all the items loaded as expected with good convergent and discriminant validity. However, from the factor analysis three variables of Faculty support were generated, Reliability tests also were conducted on the items used in the web-based survey using Cronbach's alpha. These values ranged from 0.809 to 0.962, thus indicating strong construct reliability Cavana *et al.* (2001) suggested that an alpha value of greater than 0.6 were acceptable. The level of reliability would indicate we have a high level of dependability and consistency in our finding.

5.3 Discussion of Finding

The results from Chapter Four will be discussed in detail in this section. A discussion of the demographic information will be presented, followed by the analysis of the variables and use of IT.

5.3.1 General finding

5.3.1.1 Demographic Information

There were 137 respondents, a majority of the respondents who participated in this study were in the Accounting and Finance school. Most of the respondents were between the age ranges of 18 to 25 years old. Most of the students are currently in their first year moreover, they have graduated from secondary colleges and high school. Respondents had a reasonable level of computer skill given their previous education. Meredyth *et al.* (2000) found that students from Australian high schools indicated they had high level of computer skills. Most of the students (> 90%) have their own computer at home, of those students, 71% admitted to using a computer at home everyday. From this, it can be assumed most of respondents use a computer at home regularly. Taylor and Mounfield (1991) reported that students are much more likely to use a personal computer at home.

It can be seen from the findings that we have students with a high level of computer skill and access to a computer at home. This situation need to be considered when we examine usage, computer self-efficacy, computer anxiety and computer experience.

5.3.1.2 Computer Usage

This research found that the average level of student use of computer laboratory was quite low. Half of respondents indicated that less they use computer laboratory only 0-2 hours per week. Moreover, they also indicated that less than 10% finished their class assignment by using the computer laboratory. The students indicated they needed to complete the class assignment task in their tutorial classes and that they used the university computer laboratory for 0 –2 hours per week. However, other factors such as availability of computers in the laboratories, the skill level of IT of respondents, their attitude to using computer or access to computers at home needs to be considered.

5.3.1.3 Computer Efficacy

The respondents had a high level of computer self-efficacy this was shown in Table 4.4 (mean = 4.52, SD = 0.63, Median = 5, IQR = 1). It was found that the respondents feel the 'most confident' if working on their personal computer. This would apply to students who have a personal computer at home (Taylor and Mounfield, 1991). Brown *et al.* (1989) found that who owned computers were more confident and had a positive attitude to using a computer (as the level of computer self-efficacy was found by asking for the confidence level in using a computer). As most of respondents had a computer at home, it is reasonable to expect that they had a high level of computer self-efficacy.

5.3.1.4 Computer Anxiety

The statistical analysis found that the respondents had a low level of computer anxiety (mean = 1.62, SD = 0.73, Median = 1.2, IQR = 1.2). Most anxiety, that is worrying about making mistakes on a computer, is show in Table 4.5. Most of respondents disagreed that they avoid using a computer or feel anxious when using a computer. Computer anxiety was a predictor of achievement in using computers and influenced the degree to which computers can be effectively used (Marcoulides, 1988). The respondents indicated that they have low computer anxiety, which may mean they have reasonable computer skills and use computers efficiently, the general findings supports this proposition.

5.3.1.5 Computer Experience

The overall level of computer experience of respondents was above average. More than half of respondents indicated that they have used computers for between 7 to 10 years. However, they stated that their knowledge about computer literature and software was “standard”. These results were slightly different from Meredyth *et al.* (2000) who reported the level of computer experience of high school students at “high”. However, our results are similar to Lim and Lee’s (2000) research in the IT skills of university undergraduate students enrolled in a first-year unit. They found most students have reasonable computer skills, but the level of skill is not uniformly high. Therefore, the level of computer experience of the respondents may be due to past computer arising from their previous education.

5.3.1.6 Faculty Support

Most respondents indicated the level of Faculty support as above average, this is shown in Table 4.6 (mean = 6.52, SD = 1.72, Median = 6.65, IQR = 2.76). The respondents were most satisfied with the “Number of hours open” for computer laboratory. The respondents indicated a lower level of Faculty support for “provided knowledge about software” and “computer available”. Rosen and Weil (1995) suggested that the availability of computers in the classrooms for student use, was a predictor of computer anxiety. Moreover where the level of computer use is low it could be due to respondent to the level of Faculty support and identified the need for Faculty to improve support by providing a greater number of computers.

5.3.2 Analysis of Variables and Use of Information Technology

5.3.2.1 Computer Self-efficacy and Computer Usage

The research found that there is significant relationship between computer self-efficacy and computer usage this is shown in Table 4.11 ($r = -0.21$, Sig. = 0.001). The direction of the relationship was negative. Therefore, the findings do not support the previous research of Fagan, *et al.* (2003/2004). This result was a surprising, as it was expected that computer self-efficacy should have had a positive significant relationship with computer usage (Compeau & Higgins, 1995; Belcher & Watson,

1993). These finding may be due to the meaning of computer usage within the questionnaire. Computer usage is concerned with use of computer in the Faculty laboratories. As this research only considered computer use related to laboratories, since it replicated the existing study by Fagan *et al.* (2003/2004), it do not consider the home computer use of respondents.

The level of computer usage was low, 57.4% of respondents indicated that they use computer in computer laboratories for between 0-2 hours per week, and only use several times a week. On the other hand, 93 % of respondents have their own computer at home and 71% of them admitted to using their computer at home everyday. From this point, it can be argued that the respondents have a high level of computer self-efficacy, a high level of using computer at home but a low level of using computers in the Faculty's laboratories. Moreover, the respondents are more comfortable to use their own computer, this is supported by Taylor and Mounfield (1991). They reported students are much more likely to use to personal computer at home and the high level of computer self-efficacy results from working on their personal computer.

However, our finding were similar to research conducted by Hung and Liang (2001). They found that executive with lower self-efficacy preferred systems which were more intuitive. The executives with higher computer self-efficacy will consider the systems to be more useful only when the system has tools that fit the assigned task. Therefore, respondents with high computer self-efficacy will consider using computer laboratory only when it is necessary.

5.3.2.2 Computer Self-efficacy and Computer Anxiety

From Table 4.12, it was clear that there is a significant negative relationship between computer self-efficacy and computer anxiety ($r = -0.655$, Sig. = 0.000). Therefore, the finding supports the previous research by Fagan, *et al.* (2003/2004). This finding is similar to the literature and other previous research that found a negative relationship between computer self-efficacy and computer anxiety (Harrison & Rainer, 1992; Wallace, 1999). The highest computer anxiety is where "I worry about making mistakes on a computer" Schwarzer (1996) found that worry was negatively

correlated with perceived self-efficacy. However, the coefficient indicated a moderate correlation, which was stronger than found in the previous study conducted by Fagan *et al.* (2003/2004). This could result from a slightly different research environment.

5.3.2.3 Computer Anxiety and Computer usage

This research found that computer anxiety has a positive relationship with computer usage, this is shown in Table 4.13 ($r = 0.15$, $\text{Sig.} = 0.041$). This finding is not supported from the previous research (Brosnan, 1999; Igbaria *et al.*, 1996) Based on literature, it would be expected that computer anxiety would have a negative relationship with computer usage (Scott & Rockweell, 1997; Chua *et al.*, 1999). Choi *et al.* (2002) found that respondents who use computers at higher levels (hours per week) and depend on the computer to complete work tasks report lower anxiety than those who use computers less or who do use them to complete their work.

However, the current finding as the same as previous research conducted by Fagan *et al.* (2003/2004) whose research showed a positive definite but small relationship between computer anxiety and computer usage. They explained that those using computer in laboratories, may be more anxious student as they have to spend more time to achieve the task than a less anxious student. The participants were required to use computers whether like to or not. This reason may partly explain why we had a finding of a positive relationship, albeit almost negligible. Most respondents had used the laboratories computer for less 10% to complete their assignment and this may be due to less anxious students requiring less computer laboratory time.

5.3.2.4 Computer Experience and Computer Self-efficacy

The result from collected data shows a significant positive relationship between computer experience and computer self-efficacy, this is shown in Table 4.14 ($r = 0.559$, $\text{Sig.}=0.000$). This finding is supported by other research reported in the IS/IT literature (Henry & Stone, 1994; Eastin & Larose, 2000; Harrison & Rainer, 1992). Havelka (2003) found a clear positive relationship between the number of years of experience using computer and level of software self-efficacy. The result of the current study showed that most of respondents started using computer from “7 to

more than 10 years” ago, therefore, the respondents also have a high level of computer self-efficacy. Moreover, this finding is also supported by the previous research conducted by Fagan et al. (2003/2004). They found a substantial relationship between computer experience and computer self-efficacy.

5.3.2.5 Computer Experience and Computer Anxiety

As the result show in Table 4.15, there is a substantial negative relationship between computer experience and computer anxiety ($r = -0.534$, Sig. = 0.000). Therefore, the finding has supported the previous research of Fagan, *et al.* (2003/2004). Based on the literature, the longer experience with computers, then the less computer anxiety exists (McInerney et al, 1994; Parish & Necessary, 1996). Most respondents have used computers for between 7 to 10 years and also have an average level of computer experience. It in such circumstance we could expect that the respondents had a low level of computer anxiety.

5.3.2.6 Computer Experience and Computer Usage

This research found that computer anxiety is not related to computer usage, this is shown Table 4.16 (Sig. = 0.461). The finding support the research of Larson and Smith (1994) who found that incoming students are more likely to have computer experience and perceive themselves as computer literate. However, their experience was limited to such activities as word processing, and is not necessarily predictive of learning. Moreover, Hill *et al.* (1987) suggested that although an individual might have substantial computer experience, computer experience does not guarantee successful performance and future use with computers. This reason may partly explain why the current research found a no relationship between computer experience and computer usage. However, this finding is not supported from the previous research (Fagan *et al.*, (2003/2004). It showed a positive relationship albeit almost negligible between computer experience and computer usage.

5.3.2.7 Faculty Support and Computer Self-efficacy

The results confirm the finding of previous research by Fagan *et al.* (2003/2004) that Faculty support have a positive significant relation to computer self-efficacy. Although when we tested this hypothesis, we separated Faculty Support to 3 dimensions, assistance, access and hours of operation, and reliability. As a result of the factor analysis. However, all of assistance, access and hours of operation, and reliability have positive relationship with computer self-efficacy, these are shown in Table 4.17, 4.18 and 4.19 respectively. In fact, Faculty support can take a variety of forms, such as providing knowledge about software, Faculty's attitude toward students (assistance), maintenance of equipment (reliability), total number of computers (access and hours of operation). Those supports would improve resources, which in turn help users become more skilled and lead to increased use of computers.

This finding is also supported by Igbaria *et al.* (1996), Yetton *et al.* (1999). They found that higher organizational support would result in higher judgments of self-efficacy. Fagan *et al.* (2003/2004) had a high correlation between Faculty support and computer self-efficacy, while current research a slight to low correlation, these could result from difference research environment. However, in comparison with three Faculty support dimensions, it can be seen that "Access and Hours of Operation" is the highest correlation with computer self-efficacy ($r = 0.315$, Sig. = 0.000), next is "Assistance" ($r = 0.168$, Sig. = 0.028) and lastly is "Reliability" ($r = 0.151$, Sig. = 0.042). This would show that "access and hours of operation" is the most important variable to improving user confidence in using computer. This finding is also similar to the general finding that the respondents indicated "Number of hours open" (access and hours of operation dimension) is the highest level of Faculty Support. Moreover, it can be suggested that increasing the number of computers in the computer laboratory will enhance computer self-efficacy and may influence increase used of computer laboratory.

5.3.2.8 Faculty Support and Computer Anxiety

Assistance support and access and hours of operation reported a low negative correlation with computer anxiety, these are shown in Table 4.20 and Table 4.21 respectively. However, both assistance and access and hours of operation had almost negligible relationship. Meanwhile, there is no relationship between reliability support and computer anxiety, this is shown in Table 4. 22 (Sig. = 0.101).

These finding, assistance and access and hours of operation, is supported by other research (Gist & Mitchell, 1992; Rosen, et al., 1992). Their finding were that the availability of computers in the classrooms for student use, was a predictor of computer anxiety (Rosen and Weil, 1995). Since the respondents had a level of Faculty support, reported as above average, the number of computer is quite high, therefore, low level of computer anxiety existed.

In case of reliability support, the finding is supported by the pervious research conducted by Fagan *et al.* (2003/2004). It showed no significant relationship between Faculty support and computer anxiety. Based on other literature, it would be expected that Faculty support would have a negative relationship with computer anxiety. Taylor and Todd (1995) suggested that without facilitating resources (support) it cause barriers to usage and may reduce the information of intention and usage.

5.3.2.9 Faculty Support and Computer Usage

The research found that there is no significant relationship between each support dimension and computer usage, these are shown in Table 4.23, 4.24, 4.25. These findings are not supported by the literature (Tan & Teo, 2000; Venkatesh *et al.*, 2003). Based on the literature, it was expected that Faculty support should have had a positive relationship with computer usage. However, the current findings are similar as previous research conducted by Fagan et al. (2003/2004) whose research showed no significant relationship between Faculty support and computer usage. Fagan et al. (2003/2004) explained that the items were used to measure Faculty support were developed specifically for their research, and also suggested that the use of other items to measure would have given different results. This might explain, in part, why

we had a finding of no relationship between each Faculty support dimension and computer usage.

5.4 The summary of Comparison between the Previous Research and the current research.

The previous research (Fagan *et al.*, 2003/2004) was conducted in the United States of America. The previous research involved business students while the current research involved commerce students. Most findings were similar (See Table 5.1). Three findings were found different from previous research. The current research found that computer self-efficacy has a negative relationship with computer usage, there was no significant relationship between computer experience and computer self-efficacy, Faculty support has a negative relationship with computer anxiety. Although both studies had similar research objectives, it was found that the results were not completely equivalent. This may be due to different time, school environment, and student's characteristic.

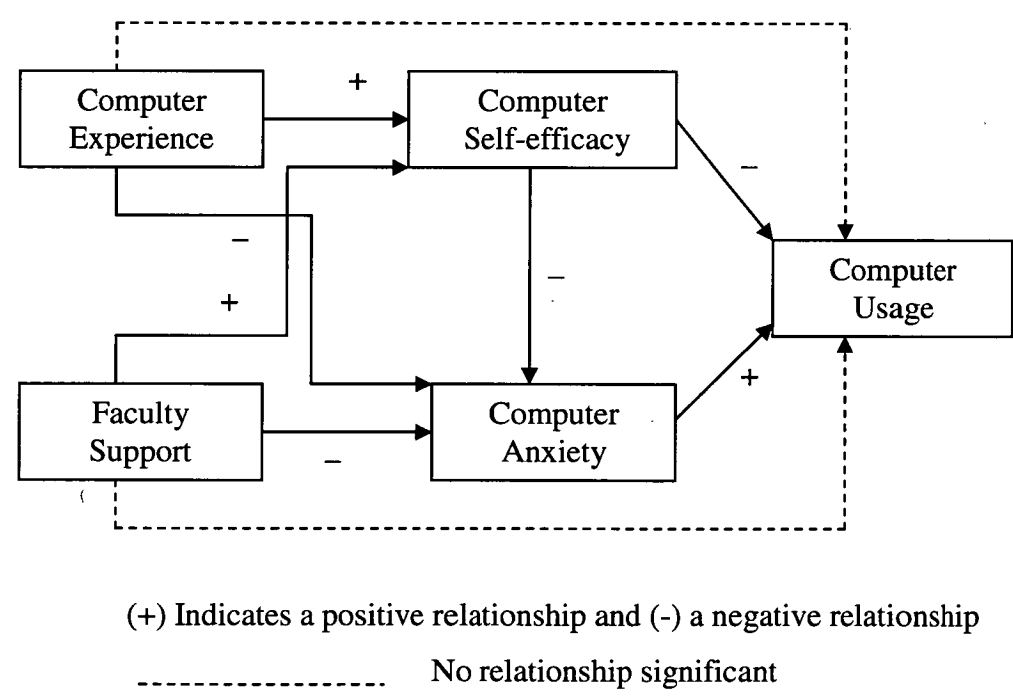


Figure 5.1: Results of Hypotheses Test

Table 5.1: The summary hypotheses comparison of current research and Fagan et al's research

Null hypotheses	Variables	Fagan et al.'s Research		Current Research	
		Direction	Result	Direction	Result
H ₀₁	Computer self-efficacy and computer usage	Positive	Reject	Negative	Reject
H ₀₂	Computer self-efficacy and computer anxiety	Negative	Reject	Negative	Reject
H ₀₃	Computer anxiety and computer usage	Positive	Reject	Positive	Reject
H ₀₄	Computer experience and computer self-efficacy	Positive	Reject	Positive	Reject
H ₀₅	Computer experience and computer anxiety	Negative	Reject	Negative	Reject
H ₀₆	Computer experience and computer use	Positive	Reject	Positive	Accept
H ₀₇	Faculty support 1 and computer self-efficacy	Positive	Reject	Positive	Reject
	Faculty support 2 and computer self-efficacy			Positive	Reject
	Faculty support 3 and computer self-efficacy			Positive	Reject
H ₀₈	Faculty support 1 and computer anxiety	Positive	Accept	Negative	Reject
	Faculty support 2 and computer anxiety			Negative	Reject
	Faculty support 3 and computer anxiety			Negative	Accept
H ₀₉	Faculty support 1 and computer usage	Positive	Accept	Positive	Accept
	Faculty support 2 and computer usage			Positive	Accept
	Faculty support 3 and computer usage			Negative	Accept

5.5 Conclusions

This research investigated the relationship between computer self-efficacy, computer anxiety, computer experience, Faculty support and computer usage in the University of Tasmania. It found that more than half of the respondents have been studying for less than one year. This research determined the level for each variable in the University of Tasmania. There were high levels of computer self-efficacy, low levels of computer anxiety and computer usage in computer laboratory, and above average levels of computer experience and Faculty support. As can be seen, most of the hypotheses tested in this research supported the previous research.

However, it was evident that computer laboratories provided by the university are not used as anticipated. As the result the respondents indicated low levels of computer availability in the laboratory, Rosen and Weil (1995) suggested that the availability of computers in the classrooms for student use, was a predictor of computer anxiety. Meanwhile, most of respondent admitted that they use computer at home everyday but indicated use of computer in laboratory at several times a week and on average for only 0-2 hours a week. Where level of computer use is low it could be due to the level of Faculty support and identify the need for Faculty to improve support by providing a greater number of computers an assistance.

5.6 Limitations

It can be said that a major limitation in this research relates to the instrument employed and where it was employed. We had a different educational environment, course unit, software, and also support setting. The ethical constraint is another limitation in that the researcher could not contact the population directly. The researcher had to rely on a third party (unit co-ordinators) to communicate details about the web-based survey.

Moreover, some respondents had problems with directly accessing the web-based survey from the word document, sent from the unit co-ordinators. This problem was due to security issues, and was out of the control of the researcher. This may have

resulted in the low response rate for this research (although response rate was acceptable).

Research was restricted to students who enrolled one of four units within the Faculty of Commerce. Additionally, as this research was a part of Master's program, there were limitations in terms of budget and time. Because of the time limitation, an opportunity to extend the sampling to increase the response rate was not allowed.

5.7 Future research

This research has added to the existing body of knowledge about key factors that affect an individual's use of computer technology. This research topic can be followed up in two to three years time to compare any differences in the results. The scope of this research was limited to four units within the Faculty of Commerce. A potential area for future research could be other faculties either at the University or at different universities. This could be further expanded to include units such as decision support and executive information systems' units that require specific computer software. If greater resources were available, a more comprehensive research could survey the whole university. Further research could consider home computer use in greater detail. Moreover, this research only considered four factors that could influence individual's use of computer. Therefore, further research should be looked into other key factors, such as the level of home computer use.

References:

Agarwal, R., Sambamurthy, V., and Stair, R.M. (2000). Research report: The evolving relationship between general and specific computer self-efficacy - An empirical assessment. *Information Systems Research*, 11(4): p. 418.

Anderson, A. A. (1996). Predictors of Computer Anxiety and Performance in Information Systems. *Computers in Human Behavior*, 12 (1): p. 61-77.

Ajzen, I., (1991). The Theory of Planned Behavior. *Organizational Behavior and Human Decision Processes*, 50 (2): p. 179.

Argyrous, G. (1996). *Statistics for Social Research*, MacMillan Education, South Melbourne.

Australian Bureau of Statistics. (2003b). Business Use of Information Technology. Cat. no. 8129.0. ABS. Canberra.

Ayerman, D. J. and Reed, W. M. (1996). Effects of Learning Styles, Programming, and Gender on Computer Anxiety. *Journal of Research on Computing Education*, 28 (2).

Babbie, E. (1990). *Survey Research Methods*, 2nd edition, Wadsworth, Belmont

Bandura, A. (1977). Self-Efficacy: Toward a Unifying Theory of Behavioral Change, *Psychological Review*, 84(2): p. 191-215.

Bandura, A., and Schunk, D.H., (1981). Cultivating competence, self-efficacy, and intrinsic interest through proximal self-motivation. *Journal of Personality and Social Psychology*, 41(3): p. 586-598.

- Bandura, A. (1986). *Social Foundations of Thought and Action: A Social Cognitive Theory*. Englewood Cliffs, NJ: Prentice Hall.
- Bandura, A. (1997). *Self-Efficacy: The Exercise of Contro*. New York: Freeman.
- Barki, H. and Huff, S.L. (1990). Implementing Decision Support Systems: Correlates of User Satisfaction and System Usage, *INFOR*, 28 (2) p. 89-101.
- Belcher, L.W. and Watson, H.J. (1993). Assessing the value of Conoco's EIS. *MIS Quarterly*, 17 (3) p.239-253.
- Bergeron, F., Raymond, L., Rivard, S., and Gara, M. (1995). Determinants of EIS use: Testing a behavioural model. *Decision Support Systems*, 14 (2): p. 131-147.
- Bergeron, F., S. Rivard, and Serre, L. D. (1990). Investigating the Support Role of the Information Center. *MIS Quarterly*, 14 (3) p. 247.
- Black, T.R. (1993), *Evaluating social science research*, Sage Publications, London.
- Bohlin, R. M. and Hunt, N.P. (1995). Course structure effects on students' computer anxiety, confidence and attitudes. *Journal of Educational Computing Research*, 13 (3) p. 263-270.
- Bronson, M. J. (1998). The impact of computer anxiety and self-efficacy upon performance. *Journal of Computer Assisted Learning*, 14 (3) p.223-234.
- Brown Jr., I., and Inouyne, D.K. (1978). Learned helplessness through modeling: The role of perceived similarity in competence. *Journal of Personality and Social Psychology*, 36(8): p. 900-908.
- Brown, S. A., Fuller, R. M. and Vician, C. (2004). Who's afraid of the virtual word? Anxiety and Computer-mediated Communication. *Journal of the Association for Information Systems*, 5 (2) p.79-107.

- Burkhardt, M.E., and Brass, D.J. (1990). Changing patterns or patterns of change: The effects of a change in Technology on social network structure and power. *Administrative Science Quarterly*, 35 (1) p. 104-127.
- Busch, T. (1995). Gender differences in self-efficacy and Attitudes Toward Computers, *Journal of Educational Computing Research*, 12 (2) p.147-158.
- Cavana, R.Y., Delahaye, B.L., & Sekaran, U. (2001). *Applied Business Research: Qualitative and Quantitative Methods*, Australian edition, John Wiley & Sons, Australia
- Chan, S.C. and M.-t. Lu (2004), Understanding Internet Banking Adoption and Use Behavior: A Hong Kong Perspective. *Journal of Global Information Management*,. 12(3): p. 21.
- Chau, P. Y. K. (2001). Influence of Computer Attitude and Self-Efficacy on IT Usage Behavior. *Journal of End User Computing*, 13 (1): p.26-33.
- Cheung, W., Chang, M. K. and Lai, V.S. (2000). Prediction of Internet and World Wide Web usage at work: a test of an extended Triandis model. *Decision Support Systems*, 30 (1): p. 83-100.
- Choi, G., Ligon, J. and Ward, J. (2002). Computer Anxiety and Social Workers: Differences by Access, Use, and Training. *Journal of Technology in Human Services*, 19. (1) p.1-13.
- Chu, P. and Spire, E. (1991). Validating the computer anxiety rating scale: Effect of cognitive style and computer courses on computer anxiety. *Computer and Human Behavior*, 7 p.7-21.
- Chua, S. L. and Chen, D. T. (1997). A review on studies of computer anxiety in the 90s. In Zahran Halim, Thomas Ottmann, and Zaidah Razak (Eds.), *Proceedings of the International Conference on Computer in Education*, p 822-829. Sarawak: University Malaysia Sarawak.

- Coakes S. J. and Steed L. G. (2003). *SPSS: Analysis without Anguish*, John Wiley & Sons Australia, Queensland
- Cohen, B.A. and WacIntyre, G. W. (1989). *Assessing Computer Anxiety, Psychological Reports*, 65, p. 735-738.
- Compeau, D.R. and C.A. Higgins, Computer self-efficacy: Development of a measure and initial test. *MIS Quarterly*, 19(2): p. 189.
- Compeau, D., C.A. Higgins, and Huff, S. (1999). Social cognitive theory and individual reactions to computing technology: A longitudinal study. *MIS Quarterly*, 23(2) p. 145.
- Couper, M.P. (2000). Web surveys: A review of issues and approaches, *Public Opinion Quarterly*, 64(4): 464-494.
- Cruz, J. (2000) *Epistemology*, Intermediate Article, Williams College, Massachusetts.
- Davis, F.D. (1989). Perceived Usefulness, Perceived Ease Of Use, And User Acceptance of Information Technology. *MIS Quarterly*, 13(3) p. 319-340.
- Desai, M. S. (2001). Computer anxiety and performance: and application of a change model in a pedagogical setting. *Journal of Instructional Psychology*, p. 1-3
- Eastin, M.S. and LaRose, R. (2000). Internet Self-Efficacy and the Psychology of the Digital Divide *Journal of Computer-Mediated Communication*, 6 (1), p. 1-29.
- Elam, J.J. and Leidner, D.G. (1995). EIS adoption, use, and impact: the executive perspective. *Decision Support Systems*, 14 (2), p 89-103.
- Elam, J.J. and Leidner, D.G. (1993). Executive information systems: their impact on executive decision making. *Journal of Management Information Systems*, 10(3), p. 139-155.

Elasmar, M. G. and Carter, M. E. (1996). Use of e-mail by college students and implications for curriculum. *Journal of Mass Communications*, 52(2), p. 46-54.

Fagan, M.H., Neill, S. and Wooldridge, B.R. (2003/2004). An empirical investigation into the relationship between computer self-efficacy, anxiety, experience, support and usage. *The Journal of Computer Information Systems*, 44(2), p.95-104.

Faught, S., Kent & Whitten, D. (2004). Doing Survey Research on the Internet: Yes, Timing does matter, *The journal of computer information systems*, 3(44), p. 26–34.

Frazer, L. & Lawley, M. (2000). *Questionnaire design and administration: A practical guide*, John Wiley & Sons Australia, Ltd., Queensland.

Foster, J. (2002). *Data Analysis: Using SPSS for Windows*, SAGE Publications Ltd., London

Gist, M.E., (1987). Self-Efficacy: Implications for Organizational Behavior and Human Resource Management. *Academy of Management Review*, 12(3): p. 427 - 485.

Gist, M., B. Rosen, and C. Schwoerer, (1988). The Influence Of Training Method And Trainee Age On The Acq. *Personnel Psychology*, 41(2): p. 255.

Gist, M.E., C. Schwoerer, and B. Rosen (1989). Effects Of Alternative Training Methods On Self-Efficacy An. *Journal of Applied Psychology*, 72(6), p. 884.

Gist, M.E. and Mitchell, R.T (1992). Self-Efficacy: A Theoretical Analysis of its Determinants and Malleability. *Academy of Management Review*, 17(2), p. 183 - 211.

Glass, C. R. and Knight, L.A. (1988). Cognitive factors in computer anxiety. *Cognitive Therapy and Research*, 12, p. 351-366.

Gos, M.W. (1996). Computer anxiety and computer experience: a new look at an old relationship. *The Clearing House*, 69, p.271-276.

- Gunn, H. (2002). *Web-Based Surveys: Changing the survey Process*, First Monday, 12(7).
- Harrison, A. W. and Rainer, R. R. (1992). The influence of individual differences on end-user computing. *Journal of Management Information Systems*, 9(1), p. 93-111
- Havelka, D. (2003). Predicting software self-efficacy among business students : a preliminary assessment. *Journal of Informaiton System Eduction*, West Lafayette 14(2) p. 145-150.
- Henry, J. W. and Stone, R. W. (1994). A structural equation model of end-user satisfaction with a computer-based medical information system *Information Resources Management Journal*, 7(3), p 21-33.
- Hill, T., Smith, N.D. and Mann, M.F. (1986). *Communicating Innovations: Convincing Computer Phobics to Adopt Innovative Technologies*
- Hill, T., Smith, N.D. and Mann, M.F. (1987). Role of Efficacy Expectations in Predicting the Decision to Use Advanced Technologies: The Case of Computers. *Journal of Applied Psychology*, 72(2), p. 307-313.
- Hinnant, C.C. and Welch, W. E. (2003). Managerial Capacity and Digital Government in the States: Examining the Link Between Self-Efficacy and Perceived Impacts of IT in Public Organizations. *Proceedings of the 36th Hawaii International Conference on System Sciences*, Track 5.
- Hong, K. S. and Koh, C. K. (2002). Computer Anxiety and Attitudes toward Computer among Rural Secondary School Teachers: A Malaysian Perspective. *Journal of Research on Technology in Education*, 35(1), p.27-48.
- Howard, G. and Smith, R. (1986). Computer anxiety in management: Myth or reality?. *Communications of the ACM*, 39, p.161-165.

- Hung, S. Y. and Liang, T. P. (2001). Effect of computer self-efficacy on the use of executive support systems. *Industrial Management + Data Systems*, 101, p.227-236.
- Igbaria, M., Parasuraman, S., and Baroudi, J. (1996). A Motivational Model of Microcomputer Usage. *Journal of Management Information Systems*, 13(1), p. 127-143.
- Igbaria, M. and Parasuraman, S. (1989). A Path Analytic Study of Individual Characteristics, Computer Anxiety, and Attitudes Toward Microcomputers. *Journal of Management*, 15(3), p. 373-388.
- Igbaria, M. and Chakrabarti, A. (1990). Computer Anxiety and Attitudes Toward Microcomputer Use. *Behaviour and Information Technology*, 19(3), p. 229-241.
- Igbaria, M. and Iivari, J. (1995). The Effects of Self-Efficacy on Computer Usage,. *Omega*, 23(6), p. 587-605.
- Igbaria, M., Schiffman, S.J. and Wieckowski, T. J. (1994). The respective roles of perceived usefulness and perceived fun in the acceptance of microcomputers. *Behavior and Information Technology*, 13 (6) p.349-361.
- Igbaria, M. (1993). User acceptance of microcomputer technology: An empirical test. *Omega*, Oxford, 21(1). p. 73 – 91.
- Johnson, R. D. and Marakas, G. M. (2000) .The role of behavioural modelling in computer skills acquisition: Toward refinement of the model. *Information Systems Research*, 11 (4) p. 403-417
- King, J. (1993). Getting Anxious about Electronic Learning. *Australian Educational Computing*, 8 p 16-20.
- Kitrilk, J. W. and Smith, M. N. (1989). Computer anxiety levels of vocational agricultural teachers. *Journal of Agricultural Educaiton*,. 30 p. 41-48.

- Klassen, R.D. & Jacobs, J. (2001). Experimental comparison of web, electronic and mail survey technologies in Operation Managements, *Journal of Operation Management*, 19 p.713–728.
- III, W.L.G. and E.J. Rozell, (2000). Computer efficacy: determinants, consequences, and malleability. *Journal of High Technology Management Research*,. 11(1): p. 109.
- Legris, P., Ingham, J., & Colletette, P. (2003). Why do people use information technology? A critical review of the technology acceptance model. *Information & Management*. 40(3) p. 191-204.
- Leitheiser, R.L. and Wetherbe, J. C. (1985). The successful Ics: What does it take?, *Proceedings of 21 st Annual Computer Research Conference, ACM*, p. 56-65
- Lengel, J. G. (2002). *The Wizard's Guide to Web Design*, Addison Wesley, U.S.A.
- Leso, T. and Peck, K. (1992). Computer Anxiety and Different types of Computer Courses. *Journal of Educational Computing Research*, 8 p. 469-478.
- Lim, K. F. and Lee, J. (2000). IT skills of university undergraduate students enrolled in a first year unit, *Australian Journal of Education Technology*, 16(3) p. 215-238
- Liu, M., Reed, W. and Philips, P. (1992). Teacher education students and computers: gender, major, prior computer experience, occurrence, and anxiety. *Journal of Research on Computing in Education*, 24, p.457-467.
- Liu, C., Arnett, K., Capella, L. & Taylor, R. (2001). Key dimensions of web design quality as related to consumer response, *Journal of Computer Information Systems*, 42(1) p. 70–77.
- Lopez, D. A. and Manson, D. P. (1997). A study of individual computer self-efficacy and perceived usefulness of the empowered desktop information system. *Journal of Interdisciplinary Studies*, 10 p. 83-92.

Magal, S. R., Carr, H. H., and Watson, H. J. (1988). Critical Success Factor Information Center Managers, *MIS Quarterly*.

Marakas, G. M., Yi, M. Y., and Johnson, R.D. (1998). The multilevel and multifaceted character of computer self-efficacy: Toward clarification of the construct and integrative framework for research. *Information Systems Research*, 9 (2) p. 126-164.

Martocchio, J. J. (1994). Effects of conceptions of ability on anxiety, self-efficacy, and learning in training. *Journal of Applied Psychology*, 79 (6) p.819-825.

Martocchio, J.J. and Dulebohn, J. (1994). Performance Feedback Effects in Training: The Role of Perceived Controllability. *Personnel Psychology*, 47 (2) p. 357-373.

Maurer, M.M. (1994). Computer anxiety correlates and what they tell us: A literature review. *Computer in Human Behavior*, 10 (3) p.369-376.

McInerney, V., McInerney, C. and Sinclair, K.E. (1994). Reliability and Factorial Variability of Computer Courses. *Journal of Educational Computing Research*, 8 p.469-478.

Meredith, D., Russell, N., Blackwood, L., Thomas, J., & Wise, P. (2000). *Real time: Computers, change and schooling*, Reported for the Australian Bureau of Statistics.

Moore, G.C.a.B., I. (1991). Development of an Instrument to Measure the Perceptions of Adopting an Informaiton Technology Innovation. *Information Systems Research*, 2(3): p. 192 - 222.

Murphy, C. A., Coover, D. and Owen, S. V. (1989). Development and Validation of the computer self-efficacy scale, *Education and Psychological Measurement* , 49, p. 893-899.

Necessary, J.R. and Parish, T.S. (1996). The relationships between computer usage and computer-related attitudes and behaviours. *Education*, 116 p.384-386.

Neuman, W. L. (2000). *Social Research Method: Qualitative and Quantitative Approaches*, 4th edition. Allyn & Bacon. Massachusetts.

Neuman, W. L. (2003). *Social research methods: Qualitative and quantitative approach*, 5th Edition, Pearson Education, Inc., United States of America.

Oliver, T. A. and Shapiro, F. (1993). Self-efficacy and computers. *Journal of Computer-Based Interactions*, 20 p. 81-85.

O'Neill, E.T., McClain, P.D., & Lavoie, B.F., *A methodology for sampling the World Wide Web*, Retrieved: October 16, 2004, from
<http://digitalarchive.oclc.org/da/ViewObject.jsp?objid=0000003447>

Orlikowski, W.J. & Baroudi, J.J (1991). Studying information technology in organizations: Research approach and assumptions, *Information Systems Research*, 2(1): 1-28.

Oxford Advanced Learner's Dictionary (2000), New York,

Page, C. & Meyer D. (2000). *Applied Research Design for Business and Management*. McGraw-Hill, NSW.

Palmius, J. (2003). *Mod_Survey v3.0.15 User's Guide*, Department of Information Technology and Media, Mid Sweden University, Sweden.

Patrick, A. S., Alex, B., and Thomas, E. W. (1995). *Rich, Young, Male, Dissatisfied Computer geeks?* Demographics and Satisfaction from the National Capital FreeNet, Proceedings of Telecommunities 95: The International Community Networking Conference, Victoria, British Columbia, p.88-107

- Raub, A. (1981). *Correlates of computer anxiety in college students*. Unpublished doctoral dissertation, University of Pennsylvania.
- Raymond, L., & Bergeron, F. (1992). Personal DSS success in small enterprises. *Information and Management*, 22, p.301-308
- Rockart, J. and Flannery, L. S. (1983). The management of end-user computing, *Communications of the ACM*,
- Rosen, L. and Maguire, P. (1990). Myths and realities of computerphobia: A meta analysis. *Anxiety Research*, 3 p. 175-191
- Rosen, L. and Weil, M. (1995). Computer availability, computer experience, and technophobia among public school teachers". *Computers in Human Behavior*, 11 p. 9-31.
- Riemenschneider, C.K., D.A. Harrison, and P.P.M. Jr, (2003). Understanding IT adoption decisions in small business: Integrating current theories. *Information & Management*, 40(4): p. 269 - 285.
- Rivard, S. and Huff, S. L. (1988). Factor of success for end-user computing. *Communications of The ACM*,
- Saks, A. M. (1995). Longitudinal field investigation of the moderating and mediating effects of self-efficacy on the relationship between training and newcomer adjustment. *Journal of Applied Psychology*, 80(2) p. 211-225.
- Schunk, D.H., (1981). Modeling and attributional effects on children's achievement: A self-efficacy analysis. *Journal of Educational Psychology*, 73(1): p. 93-105.
- Schwarzer, R. (1996) *Thought control of action: Interfering self-doubts*. In I. G. Sarason, G. R. Pierce, & B.R. Sarason (Eds.), *Cognitive interference: Theories, methods, and findings*, Mahwah, NJ: Erlbaum, p. 99-115.

Scott, C.R. and Rockwell, S. C. (1997). The effect of communication, writing, and technology apprehension on likelihood to use new communication technologies 46 (1) p. 44-62.

Sekaran, U. (2000). *Research methods for business: A skill-building approach*, 3rd Edition, John Wiley & Sons, Inc., USA.

Shaw, N.C., DeLone, W.H., & Niederman, F. (2002). Sources of Dissatisfaction in End-user Support: An Empirical Study. *Advances in Information Systems*. 33 (2) p. 41-56.

SPSS Inc (1999). *SPSS Base 10.0 Applications Guide*, SPSS Inc, Chicago, US.

Sprinthall R.C. (1997). *Basic Statistical Analysis*, Ally and Bacon, US

Staples, D.S., Hulland, J.S., and Higgins, C.A. (1998). A Self-efficacy Theory Explanation for the Management of Remote Workers in Virtual Organizations. *Journal of Computer-Mediated Communication* , 13(4) p. 1-34.

Sumner. (1985). Organization and management of the Information Center, *Journal of System Management*,

Tan, M. and Teo, T. S. H. (2000). Factor influencing the adoption of Internet banking. *Journal of AIS*, 1 (1)

Taylor, H. G. and Mounfield, L. (1991). An analysis of the success factors in college computer science: High school methodology is a key element. *Journal of Research on Computing in Education*, 24 (2) p.241-245.

Taylor, S. and Todd, P. (1995). Assessing IT Usage The role of Prior Experience. *MIS Quarterly*, 19 (4) p.561 –570.

Taylor, S. and Todd, P. A. (1995). Understanding Information Technology Usage: A Test of Competing Models. *Information Systems Research*, 6 (2) p. 144-176.

- Thatcher, J.B. and Perrewe, P.L (2002). An empirical examination of individual traits as antecedents of computer anxiety and computer self-efficacy, *MIS Quarterly*, 26 (4) p.381-395
- Thompson, R.L., Higgins, C.A. and Howell, J. M. (1991). Personal Computing: Toward a Conceptual Model of Utilization. *MIS Quarterly*, 15 (1) p. 125-143.
- Thong, J. and Yap. C.S. (1995). CEO characteristics, organisational characteristics, and information technology adoption in small business. *Omega*. 23 (4) p. 429-442.
- Ticehurst, G.W. & Veal, A.J. (1999). *Business Research Methods: A managerial approach*, Longman, Malaysia.
- Todman, J and Monaghan, E. (1994). Qualitative differences in computer experience, computer anxiety, and students' use of computers: A path model. *Computers in Human Behavior*, 10 (4) p. 529-539.
- Triandis, H. C. (1980). *Values, attitudes, and interpersonal behaviour*. In H. Howe & M. Page (Eds.), Nebraska symposium on motivation 1979 (p 195-295) . Lincoln: University of Nebraska Press.
- Triandis, H. C.(1971). *Attitude and attitude change*, Wilely:New York
- Tse, A., Tse, K. C. , Yin , C. H., and Ting, C. B. (1995). Comparing two methods of sending out questionnaires: E-Mail Versus Mail, *Journal of the Market Research Society*, 37 (4) p. 441-446.
- Venkatesh, V., and Davis, F. D. (1996). A Model of the Antecedents of Perceived Ease of Use: Development and Test. *Decision Sciences*, 27 (3) p. 451-481.
- Venkatesh, V. (2000). Determinants of perceived ease of use: Integrating control, intrinsic motivation, and emotion into the technology acceptance model". *Information Systems Research*, 11 (4) p. 342-365.

- Venkatesh, V. (2003). User acceptance of information technology: Toward a unified view1. *MIS Quarterly*, 27(3): p. 425.
- Wallace, A. R. (1999). *An exploratory study of the factors influencing the construction of computer self-efficacy*. Unpublished doctoral thesis, Charles Sturt University
- Webster, J., & Martocchio, J.J. (1992). Microcomputer playfulness: Development of a measure with workplace implications. *MIS Quarterly*, 16 (2) p. 201-226.
- Webster, J & Martocchio, J.J. (1993). Turning Work into Play: Implications for Microcomputer Software Training *Journal of Management*, 19 (1) p.127-146.
- Weil, M., Rosen, L., and Sears, D. (1987). The computerphobia reduction program: Year one program development and preliminary results. *Behavior, Research, Methods, Instruments, and Computers*, 19. p.180-184.
- Weil, M., Rosen, L. and Wugalter, S.E. (1990). The Etiology of Computerphobia. *Computers in Human Behavior*, 6 p.361-379.
- Weinberg, R.S., Gould, D., and Jackson, A. (1979). Expectations and performance: An empirical test of Bandura's self-efficacy theory. *Journal of Sport Psychology*. 14(4) p. 320-331.
- Wood, R. and Bandura, A. (1989). Social Cognitive Theory of Organizational Management". *Academy of Management Review*. 14 (3) p. 361-384.
- Yi, M. Y. and Venkatesh, V. (1996). Role of Computer Self-efficacy in Predicting User Acceptance and Use of Information Technology. *Proceedings of the Americas conference on Information Systems*, Phoenix, Association for Information Systems, Arizona p. 244-246.

Zhang, Y. and Espinoza, S. (1998). Relationships among computer self-efficacy, attitudes toward computers, and desirability of learning computing skills *Journal of Research on Computing in Education*, 30(4) p. 420-436.

Zinatelli, N., Igbaria, M., Cragg, P. and Cavaye, A. (1997). Personal computing acceptance factors in small firms: a structural equation model *MIS Quarterly*, 21(3) p.369-383.

Appendix A:

Information Sheet

INFORMATION SHEET

Study Title

An Investigation into the relationship between computer self-efficacy, anxiety, experience, support and usage in Australia

Chief Investigator:

Mr. Paul Campton, Lecturer,
School of Information Systems,
University of Tasmania

Other Investigator:

Miss Janporn Boonyong
Student enrolled in Masters of Information Systems,
University of Tasmania

Purpose of the Study

Businesses are increasingly using Information Technology (IT) to meet their business goals. Given the resources allocated to IT it is important that organizations address the issue of user acceptance of IT. The information systems literature has found computer self-efficacy represents an important individual trait, which moderates organizational influences on an individual's decision to use computers. This study is interested in computer self-efficacy and other key factors involved in an individual's use of information technology. Research has shown commerce students to be a suitable population for research into self-efficacy, anxiety, experience, support and usage.

This study is being undertaken to fulfil part of the requirements for a Master Degree in Information Systems.

It is anticipated that this study will:

1. Investigate the current practice of computer self-efficacy, anxiety, experience, support and usage with Commerce students at University of Tasmania.

2. Explore the role of computer self-efficacy, anxiety, experience, support and usage in the acceptance and use of information technology.

3. Extend the knowledge in area of the factors those influence the use of information technology.

Participant Benefit

It is anticipated that the research will provide valuable insight for researchers and practitioners about the factors relating to students' use of IT as well as its acceptance and use in Australia. Moreover, the result may be of benefit in Australian organizations as it considers the factors that may influence an individual's use of information technology. This may help to increase efficiency and productivity within organizations.

Study Procedures

You are invited to participate in this research as you are enrolled in a first year unit within the Faculty of Commerce in second semester, 2004 at University of Tasmania. Your involvement in this study will be limited to the completion of one web-based questionnaire that is anticipated to take approximately 20 minutes or less. The School of Information Systems, University of Tasmania, supports the questionnaire through a password protected URL address host.

Payment to Subjects

There is no payment for participating in this research project.

Possible risks or discomforts

You will not be subject to risks or discomforts while participating in this research project.

Confidentiality

Data and information collected will be treated in a confidential manner. No names or identifying information will be recorded in the questionnaire. The electronic form of the data will be stored on a secured computer server within the School of Information Systems, University of Tasmania. These files will be password protected to prevent

unauthorized access. The data will be kept for the mandatory five-year period after which it will be deleted or destroyed under appropriate supervision.

Freedom to refuse or withdraw

Your participation in this survey is entirely voluntary. Completion and the return of this survey are taken to constitute your consent to participation.

Contact persons

If you require further information about this research, please contact the Chief Investigator, Mr. Paul Campton, on (03) 62266212, or by email to: paul.campton@utas.edu.au

Statement regarding approval

The project has received ethical approval from the Human Research Ethics Committee (Tasmania).

Concerns or complaints

If you have any concerns of an ethical nature or complaints about the manner in which the project is conducted, you may contact the Executive Officer of the Human Research Ethics Committee (Tasmania) Network. The Executive Officer can direct you to the relevant Chair of the committee that reviewed the research.

Executive Officer: Amanda McAully (03) 6226 2763

Amanda.McAully@utas.edu.au

Fax: (03) 6226 7148

Results of investigation

Results of the investigation in this study will be compiled and presented in a thesis as a partial fulfilment for the degree of Master of Information Systems. The results may also be used in subsequent academic papers or research. In either circumstance, confidentiality and anonymity will be upheld.

An electronic copy of this study will be made available to those interested in the outcomes of the research at the following URL: <http://www.infosys.utas.edu.au/research/papers>. Alternatively, you may contact the chief investigator to arrange a copy of the results and finding of this research.

Mr Paul Campton

Ms Janporn Boonyong

Appendix B:

Questionnaire

An Investigation into the relationship between computer self-efficacy, anxiety, experience, support and usage in Australia

You are invited to participate in this study. You have been chosen as you are enrolled in a first year unit within the Faculty of Commerce at the University of Tasmania. Your involvement in this study will be limited to the completion of a web-based questionnaire that is anticipated to take approximately ten minutes or less to complete. The questionnaire is supported through a password protected URL address hosted by the School of Information Systems, University of Tasmania. Data and information collected from all questionnaires will be treated in a confidential manner. You will not be asked for identifying information therefore the data collected will be totally anonymous. The data collected will be stored on a password protected secure server in the school. It will be kept for the mandatory five years period after which the data will be destroyed under the supervision of an appropriate officer in the school. This project has received ethical approval from the Human Research Ethics Committee. If you have any concerns of an ethical nature or complaints about the manner in which the project is conducted, you can contact Ms Amanda McAully (03 6226 2763 the Executive Officer of the Human Research Ethics Committee (Tasmania) Network. The Executive Officer can direct you to the relevant Chair of the committee that reviewed the research.

Results of the investigation in this study will be published in a Master's thesis in the School of Information Systems. This research may also be used in academic research papers. In either circumstance, confidentiality and anonymity will be upheld. A copy of this research will be made available to those interested in the outcomes of the research at the following URL:
<http://www.infosys.utas.edu/research/papers>. Alternatively, if you are interested in obtaining a copy of this research, please contact the chief investigator. Your participation is entirely voluntary. You may decide to take part in the study and you can withdraw at any time without prejudice. Thank you for your assistance with this research. If you require further information about this study, please contact the Chief Investigator, Mr. Paul Campton on (03) 62266212, or by email to: paul.campton@utas.edu.au or the researcher Janporn Boonyong, janpornb@utas.edu.au.



An investigation into the relationship between computer self-efficacy, anxiety, experience, support and usage

Section A: Demographic Information

The purpose of this section is to gather demographic information about the respondent. Please tick the appropriate box.

1. What is your gender?

☐ Male

☐ Female

2. What is your age range?

☐ Below 18 years

☐ 18 - 25 years

☐ 26 - 35 years

☐ 36 - 45 years

☐ Above 45 years

3. What is your major in this Faculty?

☐ Accounting and Finance

☐ Economics

☐ Information Systems

☐ Management

☐ Other (Please specify)

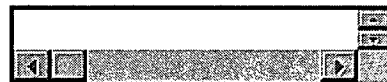


4. How long have you been studying in this university?

- ☐ less than 1 year
- ☐ 1 year
- ☐ 2 years
- ☐ 3 years
- ☐ 4 years or more

5. What is your highest level of education?

- ☐ High School
- ☐ Secondary College
- ☐ TAFE
- ☐ Bachelor Degree
- ☐ Graduate Diploma
- ☐ Masters Degree
- ☐ PhD
- ☐ Other (Please specify)



6. How many of your units this semester require you to use the computer lab?

- ☐ None
- ☐ 1
- ☐ 2
- ☐ 3
- ☐ 4
- ☐ 5 or more

7. Do you have a computer at home?

- ☐ Yes
(if yes, please continue to the questions 8)
- ☐ No (if no, please proceed to section B)

8. On average, how frequently do you use your home computer?

- ☐ Less than once a month
 - ☐ Once a month
 - ☐ A few times a month
 - ☐ Once a week
 - ☐ A few times a week
 - ☐ Everyday
-

Section B: Computer Usage

The purpose of this section is to gather information related to Computer Usage. Please tick the appropriate box

9. How often do you work in the computer lab?

- ☐ Never
- ☐ Several times a semester
- ☐ Several times a month
- ☐ Once a week
- ☐ Several times a week

10. Currently on average how many hours a week do you use the computer lab?

- ☐ 0 - 2 hours
- ☐ 3 - 5 hours
- ☐ 6 - 8 hours
- ☐ 9 -11 hours
- ☐ 12 hours or more

11. What percentage of your computer work for class assignments is done in the computer lab?

- ☐ Less than 10 %
- ☐ 10 - 25 %
- ☐ 26 - 50 %
- ☐ 51 - 70 %
- ☐ 71 - 100 %

Section C: Computer Self-efficacy

The purpose of this section is to gather information related to computer self-efficacy. Please tick the appropriate box which best describes your level of agreement with each statement

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I feel confident calling up a data file to view on the monitor screen	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I feel confident entering and saving data into a file	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I feel confident escaping/exiting from a program or software	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I feel confident working on personal computer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I feel confident using a printer to make a hardcopy of my work	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Section D: Computer Anxiety

The purpose of this section is to gather information related to computer anxiety. Please tick the appropriate box which best describes your level of agreement with each statement

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I try to avoid using a computer whenever possible	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I worry about making mistakes on a computer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I feel overwhelmed whenever I am working on a computer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I feel anxious whenever I am using a computer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I feel tense whenever working on a computer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Section E: Computer Experience

The purpose of this section is to gather information related to computer experience.

12. Please indicate your overall computer literacy.

- ☐ Low
- ☐ Below Average
- ☐ Average
- ☐ Above Average
- ☐ High

13. How many years ago did you first begin using computers?

- ☐ Less than 1 year
- ☐ 1 - 3 years
- ☐ 4 - 6 years
- ☐ 7 - 9 years
- ☐ More than 10 years

























































































































14. How knowledgeable are you about computer and software?

- ☐ Not at all
- ☐ Slightly
- ☐ Somewhat
- ☐ Fairly
- ☐ Very

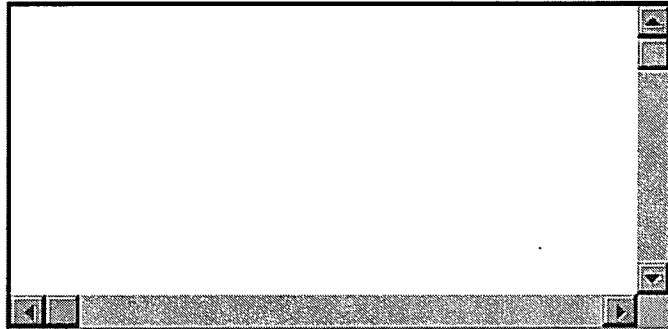
Section F: Faculty Support

The purpose of this section is to gather information related to faculty support, which including access to equipment, assistance, hours of operation, atmosphere, and reliability. Please rate your faculty support using the following scale: 1 indicates " Poor", 5 indicates " Moderately", and 10 indicates " Excellent".

	1	2	3	4	5	6	7	8	9	10
Availability of equipment when needed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Waiting time for a computer to be available	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Total number of computers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Computer hardware up to date	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Assistance in equipment use	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Faculty's attitude toward students	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Support in assisting with problems	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Provided knowledge about software	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Response time to problems	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Student orientation provided	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ability to concentrate on work	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Quite working environment										
Confidentiality of work										
Number of hours open										
Evening hours/closing time										
Open when needed										
Hours of operation on weekends										
Full/Complete software functionality										
Working order of computers										
Maintenance of equipment										
Reliability of equipment										
Reliability of software										
Dependability of hardware										

You are welcome to make comments on any other factors that may have affected the adoption of information technology. (Please avoid from using characters such as ; & " < > ' \$, as this would cause problem when submitting).



Thank you once again for your valuable participation to this research.

Your contribution is highly appreciated.

If you have any questions, please do not hesitate to contact the chief investigator (Mr. Paul Campton, 03 - 62266212, paul.campton@utas.edu.au). or student researcher Janporn Boonyong (janpornb@utas.edu.au) for further clarification.

Submit	Clear
--------	-------

Mod_Survey v3.0.16-pre2 (pre-releases) © Joel Palmius in 2004

Appendix C:

Ethics Approval

Southern Tasmania Social Sciences Human Research Ethics Committee (HREC)
APPLICATION APPROVAL

To: Mr Paul Campton
School of Information Systems
University of Tasmania
Private Bag 87 HOBART

From: Amanda McAully (Executive Officer)

Date: 16 July 2004

Subject: **H8009:** An investigation into the relationship between computer self-efficacy, anxiety, experience, support and usage in Australia.


The Southern Tasmania Social Sciences Human Research Ethics Committee has recommended approval of this project. You are required to report immediately anything that might affect ethical acceptance of the project, including:

- serious or unexpected adverse effects on participants;
- proposed changes in the protocol;
- unforeseen events that might affect continued ethical acceptability of the project.

You are also required to inform the Committee if the project is discontinued before the expected date of completion, giving the reasons for discontinuation.

Ethics approval is subject to annual review, therefore not completing a report could affect the project's continuing ethics approval. Please submit your first report on this project by **6 August 2005**. The Annual report form can be found on our website:
<http://www.research.utas.edu.au/rdo/ethics/human.htm>

Important: If research on the project has finished, please complete the above form selecting the "Final Report" option, and return as soon as possible for audit purposes.



Amanda McAully (Executive Officer)

Appendix D:

Factor Analysis

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.875
Bartlett's Test of Sphericity	Approx. Chi-Square	4763.021
	df	741
	Sig.	.000

Rotated Component Matrix (a)

	Component						
	1	2	3	4	5	6	7
suppor21	.898						
suppor20	.891						
suppor23	.867						
suppor19	.841						
suppor22	.839						
suppor04	.713						
suppor18	.653						
suppor17		.843					
suppor15		.820					
suppor16		.795					
suppor14		.781					
suppor02		.739					
suppor03		.728					
suppor01		.653					
effica02			.899				
effica03			.849				
effica05			.817				
effica01			.815				
effica04			.803				
Exerp1			.670				
Exerp3			.552				
suppor10				.839			
suppor08				.804			
suppor05				.704			
suppor07				.696			
suppor09				.619			
suppor11				.525			
suppor06				.510			
suppor13							
anxiet05					.821		
anxiet04					.809		
anxiet03					.678		
anxiet02					.665		
anxiet01					.520		
Usage2						.862	
Usage3						.858	
Usage1						.774	
suppor12							.526
Exerp2							

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.
a Rotation converged in 8 iterations. Consider only positive value.